The RUBBER AGE

July, 1946

R. T. VANDERBILT CO. INC. AMERICAN PRODUCTS

SETSIT-5

The latest thing for vulcanizing latex... either natural or GR-S —at low or moderate temperatures...

●

FAST CURING... HIGH TENSILES ...GOOD AGING

ASK FOR BOOKLET

R. T. VANDERBILT CO., INC.

230 Park Ave., New York

Du Pont
NEWSLETTER No. 7, JULY 1946
RUBBER CHEMICALS DIVISION
PUBLISHED BY E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DELAWARE

Follow the *Color* Trend!

EVERY rubber manufacturer knows that today the public wants color—color in garden hose, toys, balloons, gloves and hundreds of other consumer products. To help meet this demand we offer a group of excellent organic colors—the best we've ever produced!

These Du Pont Colors—designated as SELECT—were carefully chosen for their—

- **Versatility**
- **High Tinctorial Strength**
- **Good Dispersibility**
- **Excellent Light-Fastness**
- **Stability to Various Vulcanizing Conditions**
- **Freedom from Bleeding, Migration, Crocking**
- **Effectiveness in Rubber, Neoprene, GR-S-50, etc.**

DU PONT *SELECT* RUBBER COLORS cover a wide range of hues—produce almost any hue in the visible spectrum when blended in proper proportions.

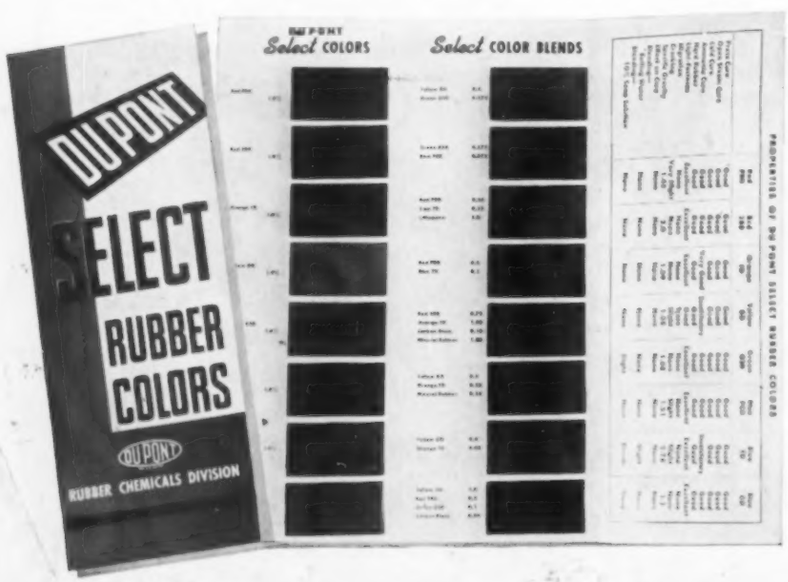
IN DRY COMPOUNDING, either dry powder or latex dispersed colors may be used. The former are soft in texture and disperse very readily. The latter are similar to Du Pont Rubber Dispersed Colors offered before the war, but are dispersed in GR-S latex.

IN LATEX COMPOUNDING, a complete line of dry powder colors, supplemented with two water dispersed pastes, is available. Dry powder *Select* Colors are easily dispersible in aqueous solutions to give fine particled suspensions, are compatible with the latices, and are unaffected by alkalies and other stabilizing agents.

Pleasing, permanent effects can be obtained with *Select* Colors in neoprene latex.

ABOUT COLOR MATCHING

When requesting an exact color match, it is necessary for you either to supply us with your exact formula along with brands and types of ingredients used in the base in which the color is to be used or even better a pound or two of your base stock. Be sure also to supply us with method, temperature, and time of cure.



WRITE FOR THIS COLOR GUIDE!—

Shows 16 samples of Du Pont SELECT Colors, blends, and their properties. Also gives the basic formula used in preparing these samples. Just address E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Del. (For further data on Du Pont SELECT Colors, ask for Report BL-156.)

* * *

DUPONT
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. July, 1946. Vol. 59, No. 4.

ECHNOLOGY DEPT.

SUPERIOR ABRASION RESISTANCE

Parts made from HYCAR synthetic rubber have 50% greater abrasion resistance than parts made from natural rubber. That means they'll last longer, give more dependable performance in the most severe service, and save maintenance and replacement time.

But that's only one of HYCAR's unusual and valuable properties. Examine the list in the box at the right. Think of these properties in terms of your requirements of rubber parts. Realize that these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part.

We have developed more than 5000 recipes for HYCAR compounds — each compound engineered to do a certain job. If you're looking for rubber parts that will give long life, dependability, and economical operation, *specify HYCAR.*

Ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Department HD-7, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. *EXTREME OIL RESISTANCE — insuring dimensional stability of parts.*
2. *HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.*
3. *ABRASION RESISTANCE—50% greater than natural rubber.*
4. *MINIMUM COLD FLOW—even at elevated temperatures.*
5. *LOW TEMPERATURE FLEXIBILITY—down to —65° F.*
6. *LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.*
7. *AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.*
8. *HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.*
9. *NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)*

Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATELY PRODUCED BUTADIENE TYPE

Synthetic Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

HUBBA HUBBA . . .

you ain't seen nothing yet!

A hot number—hotter than the dancing girls at the A. C. S. banquet—with all the important requirements for a swell performance. And with Philblack A you get that same excellent performance in your finished products—EXCELLENT ABRASION—HIGH MODULUS—GOOD FLEX LIFE—LOW HYSTERESIS—AND TENSILE STRENGTHS IN EXCESS OF EPC AT 200°F. And always that added extra—savings in processing time.

PHILLIPS PETROLEUM COMPANY

Philblack Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

They're Lovely...

A few of the thousands of products that can be made from GEON raw materials

Boldly but beautifully colored shower and window curtains... a delicately shaded shower cap... baby's modern spotproof bib and mother's gay apron... sister's stylish raincape...

All these were fabricated from flexible films made from GEON raw materials. But they're only a handful of the thousands of exciting new products that can be made from GEON. For versatile GEON may be pressure or injection molded, extruded, calendered, cast into sheets or film, or applied as coatings to all types of textiles and papers.

And products made from GEON may have any number of unusual properties in a wide variety of combinations. For example, products made from GEON may be made resistant to water, oils, acids, foods, air, heat, cold, abrasion, mildew, cracking, creasing, and many other normally destructive factors. They may be brilliantly or delicately colored; flexible or rigid; transparent or opaque. There are applications for GEON in literally *every* home, *every* industry.

For more information about GEON please write B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Geon
Polyvinyl Materials

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

For technical data please write Dept. RB-7

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

Products with a *definite* purpose

Bunac K-17

Purpose . . . To give you GR-S stocks with level curing properties, better aging characteristics, and increased flex crack resistance.

Naftex

Purpose . . . To give you a free-flowing pellet mixture of carbon black and sulfur-reactive plasticizer that will reduce mixing time, reduce carbon black dust, and eliminate the handling of liquid plasticizers in your plant.

Wilcor-Plast

Purpose . . . To give you an exceptionally low-cost plasticizer for general use in synthetic, natural, and reclaimed rubber compounds.

Wilmac D-X

Purpose . . . To give your highly loaded Silene-GR-S stocks easier mixing and better processing properties, with reduced adherence to mill rolls.

Plasticizer Emulsions

Purpose . . . To give you water dispersions of rubber plasticizers that can be used to advantage in latex compounds and adhesives.

Wilcorite R-30

Purpose . . . To give you a modified phenolic resin that is specifically designed to impart tack to GR-S.

Wilcorite R-10H and R-11H

Purpose . . . To give you modified phenolic resins for use with BUNA N type rubbers, with the possibility of obtaining a wide range of unique properties.

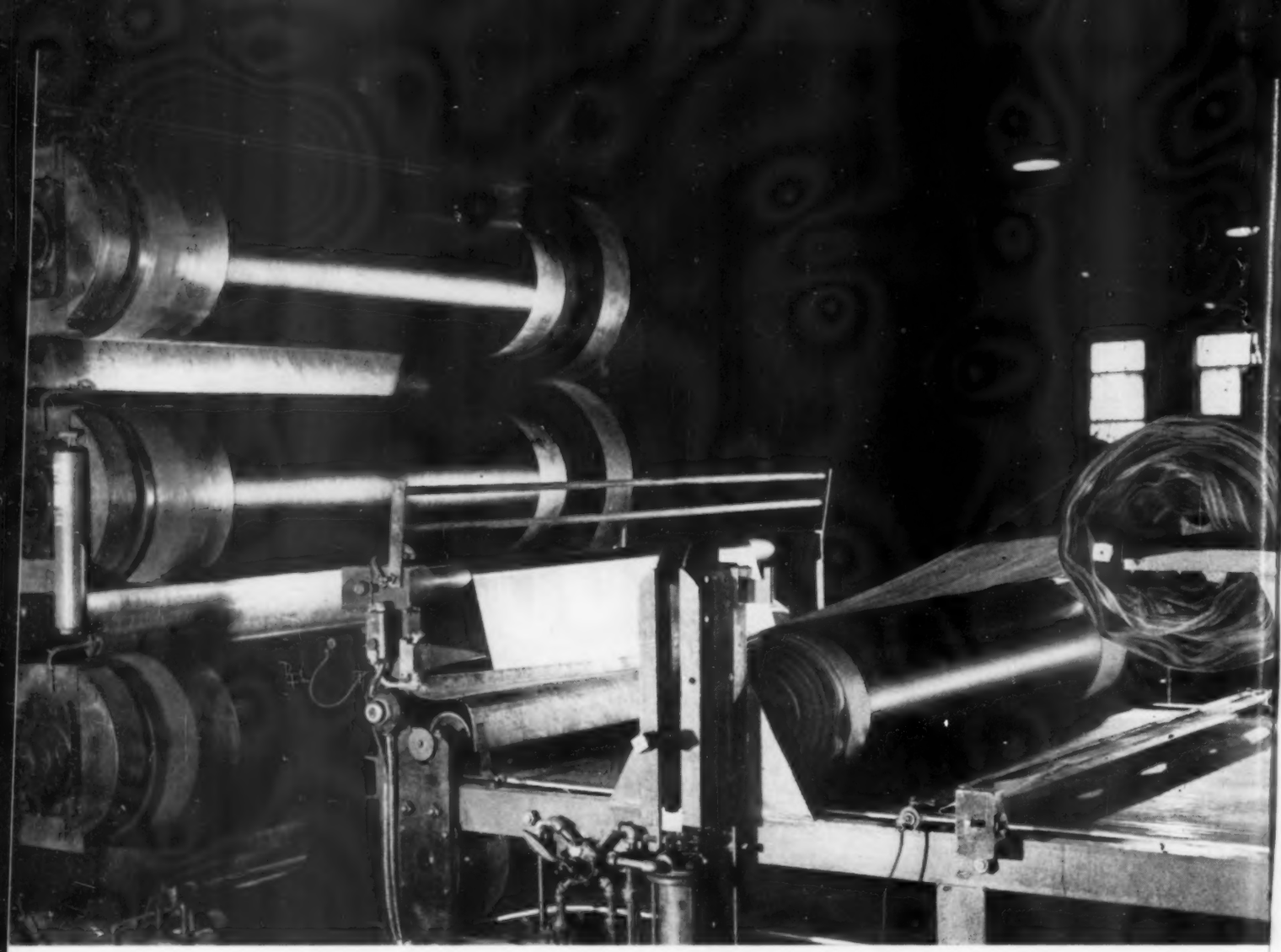
Wilcorol P-200W

Purpose . . . To give you an all-purpose resorcinol adhesive for bonding a large variety of dissimilar materials, including rubber.

Wilcor Reclaiming Oil No. 111

Purpose . . . To give you a reclaiming oil that will swell both GR-S and natural rubber scrap to the same extent.

WILMINGTON
CHEMICAL CORPORATION
10 EAST 40TH STREET • NEW YORK 16, N. Y.



As your stock leaves the calendar roll it into a CLIMCO PROCESSED LINER

GET THE FULL STORY ON CLIMCO PROCESSING

Illustrated booklet tells about Climco Liners and Linerette. Tells how to get better service from liners. Write for your copy now.

This will insure better separation and speedier production. Labor and power will be saved, liner life increased and stock losses reduced . . . Climco Processed Liners also protect your stock in many ways. For example: tackiness is preserved, gauges are more easily maintained, latitude in compounding is enlarged, lint and ravelings are eliminated. In addition, air, moisture and sunlight are excluded; oxidation, mould and bloom are prevented . . . For 24 years Climco Processed Liners have been used by leading rubber companies to protect stocks and speed production. *Give them a trial in your plant!*

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

THE CLEVELAND LINER & MFG. CO.
5508 MAURICE AVENUE • CLEVELAND 4, OHIO

CLIMCO PROCESSED LINERS

for Faster, Better Production at Lower Cost

when it's time for ECONOMY...

specify *Buffalo Reclaims*

You'll have to agree it's always time for economy—and for reliability too. Therefore it won't come as a surprise to our old customers that leading manufacturers of finished rubber products make sure of economy and reliability by specifying BUFFALO RECLAIMS.

Did you know that BUFFALO subjects ALL its reclaims to rigid laboratory control? . . . that behind *U. S. Rubber Reclaiming* are 64 years of service to the industry SOLELY as reclaimers?

Write us about your reclaimed rubber problems . . . in our broad experience there's a good chance you'll find your answer.

U. S. RUBBER RECLAIMING COMPANY, INC.

500 FIFTH AVENUE • NEW YORK 18, N. Y. • (Plant at Buffalo, N. Y.)

TRENTON . . . H. M. ROYAL, Inc., 689 Pennington Avenue • TORONTO . . . H. VAN DER LINDE, Ltd., 156 Yonge Street

64 Years Serving the Industry Solely as Reclaimers

Neoprene-covered seismograph cable
Photo Courtesy: General Geophysical Company

• In the compounding of neoprene, K&M Light Magnesium Oxide has *proved* that top quality pays off. That is why so many leading neoprene compounders insist on K&M Light Magnesium Oxide.

Originating in crude Dolomite rock, this feather-light powder was carefully developed by America's pioneer manufacturer of magnesia products to meet the specific needs of neoprene compounders. One grade only is produced . . . the *finest.*

K&M Light Magnesium Oxide is available now . . . order it from one of the stock points listed below.

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

One of America's oldest and most reliable makers of asbestos and magnesia products

K&M best in asbestos

OUR DISTRIBUTOR FOR LIGHT MAGNESIUM OXIDE IS:

AMERICAN CYANAMID & CHEMICAL CORPORATION

30 Rockefeller Plaza, New York 20, N. Y.

WITH SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:

AKRON, OHIO, Akron Chemical Company
BOSTON, MASS., Ernest Jacoby & Company
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LOS ANGELES, CAL., H. M. Royal, Inc.
TRENTON, N. J., H. M. Royal, Inc.

DISPERSITE*

Water dispersed Rubbers and Resins...

—Specified by Leaders of Industry

—for Coating, Saturating and Bonding

We make Solid Materials Liquid

DISPERSIONS PROCESS, INC.

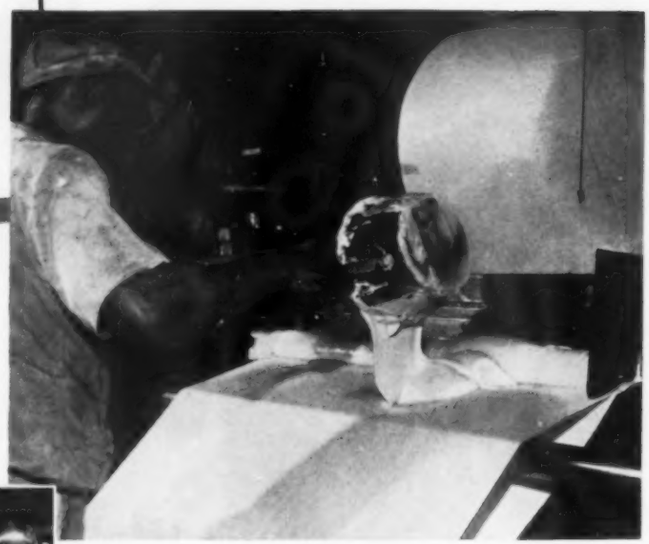
Under Management of United States Rubber Company

1230 AVENUE OF THE AMERICAS · NEW YORK 20, N. Y. BRANCHES: AKRON · BOSTON · DETROIT · NAUGATUCK

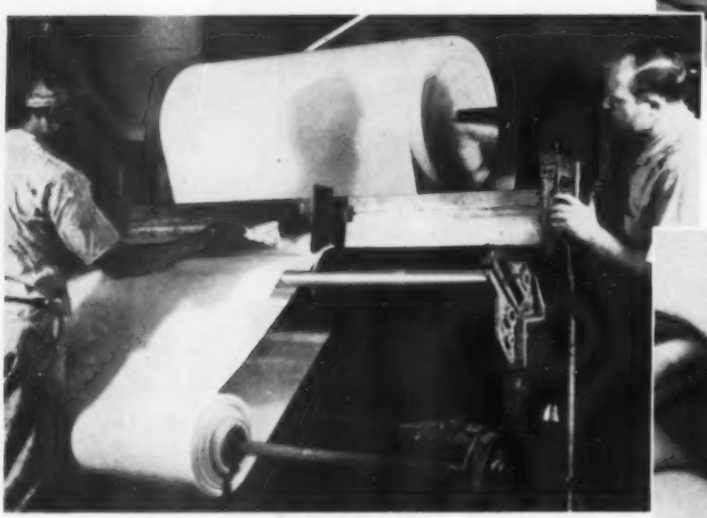
*REG. U.S. PAT. OFFICE

ONE SHOT COMBINING

Bone Dry Lamination . . .
Maximum Speed of Production . . .



Application of UBS compounded GR-S Latex Combining Cement to fabric at coating knife. Note heavy viscosity and body, enabling efficient handling and application.



Wet Combining in process in same Can Drier operation. Note rolling bank of UBS Combining Cement at knife and high solids film deposit of sufficient depth to enable wet stick.

UBS compounded GR-S Latex Combining Cement provides a positive, *one coat* bond, good flexibility, and excellent moisture resistant and ageing qualities.

Phone, wire or write for further information.

Address all inquiries to the Union Bay State Chemical Company, 50 Harvard St., Cambridge 42, Mass.

UBS

UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

RIDACTO

ACCELERATOR ACTIVATOR

Gives Balanced Vulcanization to GR-S—Natural Rubber Mixtures . . . .

Vulcanization of GR-S — natural rubber mixtures presents a problem for compounders. There is no right dosage of conventional accelerators for each component.

Result: unbalanced vulcanization.

The *Remedy* is found by using RIDACTO with thiazoles. RIDACTO selectively activates GR-S more strongly than natural rubber and its use assures better balanced vulcanization of mixtures.

Other Advantages of RIDACTO . . .

- Flatter modulus with GR-S
- Better Heat Life with GR-S
- Prevents Revision with Natural Rubber
- Inexpensive

Samples and Technical Information on Request

RIDBO

RIDBO LABORATORIES, Inc.
111-117 PENNSYLVANIA AVE.
PATERSON 3, NEW JERSEY

WHAT IS YOUR

IT PAYS TO KNOW *MORE* ABOUT

HERCULES

RPROBLEM?

. . . A LETTER TO HERCULES MAY GIVE YOU THE ANSWER, as it is doing for hundreds of others every month . . .

Are you seeking chemical materials that might better the quality or performance of your products, or improve their processing? If so, take a cue from the hundreds of other manufacturers who write to us every month for help in the selection and use of Hercules chemical materials.

Hercules' broad experience in the development, production, and application of terpene and rosin chemicals, synthetics, cellulose products, chemical cotton, and other chemical materials for the rubber industry, can guide you toward the most effective and economical ways to employ these products.

Drop us a line today, outlining your problem or mentioning the Hercules chemical materials in which you are interested. Your inquiry will receive prompt attention, no matter how moderate your needs.

*Reg. U. S. Pat. Off. by Hercules Powder Company

HEMICAL MATERIALS FOR HE RUBBER INDUSTRY

Hercules chemical materials for the rubber industry include:

Solvenol* . . .
A strong solvent for rubber, with a slow rate of evaporation. Widely used in rubber reclaiming.

Staybelite* Esters . . .
Low-cost tackifiers, compatible with all synthetic rubbers. Valuable in pressure-sensitive adhesives.

Chemical Cotton . . .
Basis for the toughest high-tenacity rayon for automobile tires, hose, belting, and other rubber products.

Dresinate* 731 . . .
One of Hercules' many resin derivatives, Dresinate 731 is the emulsifying agent used to make GR-S-10.

Nitrocellulose . . .
Hercules nitrocellulose and ethyl cellulose provide lacquers of maximum adhesion, durability, gloss, and color.

Staybelite* Resins . . .
Odorless, non-staining softeners for natural rubber.

FOR FURTHER DETAILS

HERCULES POWDER COMPANY
INCORPORATED

918 Market Street, Wilmington 99, Delaware

Please send information on_____

_____

Name_____

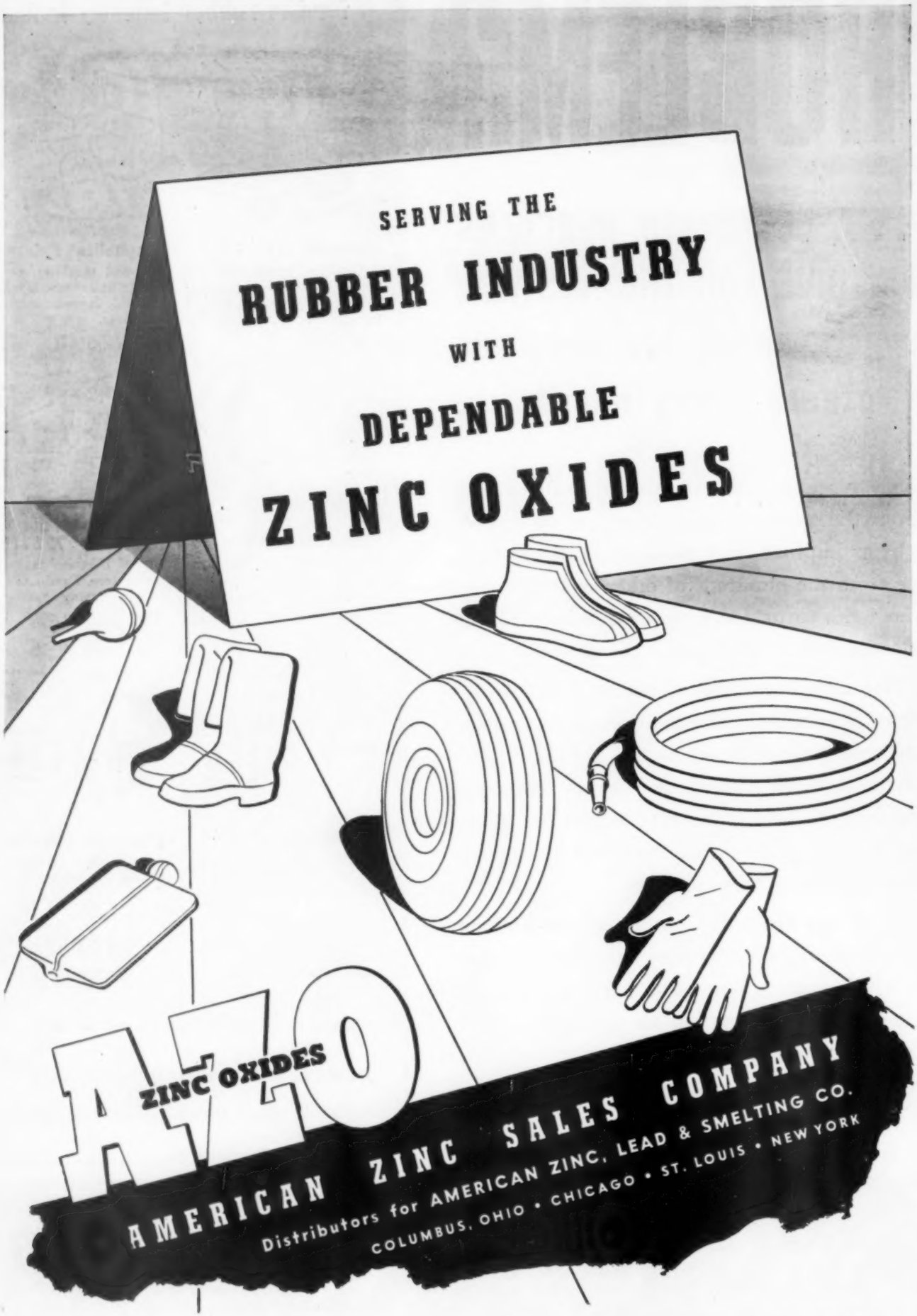
Title_____

Company_____

Street_____

City_____ Zone_____ State_____

R-64


SERVING THE
RUBBER INDUSTRY
WITH
DEPENDABLE
ZINC OXIDES
AZO
ZINC OXIDES
AMERICAN ZINC SALES COMPANY
Distributors for AMERICAN ZINC, LEAD & SMELTING CO.
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

Squeezing out COSTLY PLASTICIZERS

SUN RUBBER-PROCESSING AIDS...

Produce Softer, Non-Blooming Products; Cut Milling Time

A big Chicago rubber processor, using natural rubber, Hycar, and Neoprene, called in a Sun Engineer to recommend the proper "Job-Proved" processing aids.

Excessive milling time was required in the use of high-cost plasticizers, vegetable and paraffin oils; poor dispersion and blooming were encountered.

The Sun Engineer recommended Circo Light Process Oil for his job, one of the processing aids developed by Sun for the rubber industry, and proved in hundreds of actual cases. After intensive trials, the management reported:

"We reduced milling time, obtained superior dispersions, improved processed raw stocks, and were able to produce softer, non-blooming, cured products."

Circosol-2XH and Circo Light Process Oil are being used extensively in the manufacture of sponge and other rubber products. This case is typical of their "Job-Proved" performance. For easier processing, smooth production, call the Sun man near you today.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas

SUN

SUNOCO

INDUSTRIAL PRODUCTS

Through Passenger Service
Designed to Meet
INDUSTRY'S NEEDS

Here is a new passenger train service ideal for industrial executives making business trips between the East and West Coasts. This no-extra-fare service is 10 to 18 hours faster than previous service between Chicago-St. Louis and the West Coast terminals.

Between
NEW YORK-WASHINGTON, D. C.
and **LOS ANGELES-SAN FRANCISCO**

• • • •

From New York . . . through sleeping-cars depart on the New York Central and the Pennsylvania railroads. On arrival at Chicago they are carried through to Los Angeles on the Transcontinental; to San Francisco on the Overland.

From Washington, D. C. . . . through sleeping-cars departing on the Pennsylvania are carried through from Chicago to Los Angeles on the Transcontinental—to San Francisco on the Pacific Limited. Departing on the Baltimore and Ohio, sleeping-cars are carried through to San Francisco on the Pacific Limited.

Similar service available eastbound from Los Angeles and San Francisco. No change of cars enroute in either direction.

Between
ST. LOUIS-KANSAS CITY-DENVER
and **PACIFIC COAST**

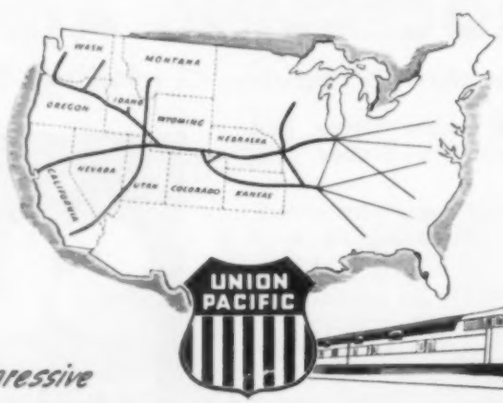
• • • •

Departing from St. Louis on the new Streamliner "CITY OF ST. LOUIS" through sleeping-cars are routed to Portland-San Francisco and Los Angeles (via Kansas City-Denver) with no change of cars enroute. Similar service is available eastbound from the West Coast.

• • • •

For complete information regarding schedules, accommodations and other passenger service to or from the Union Pacific West, inquire at your local ticket office.

TO VACATIONISTS . . . Union Pacific serves more western scenic regions than any other railroad. These include California, Pacific Northwest, Colorado, Yellowstone and the National Parks of Southern Utah-Arizona.



be Specific – say "Union Pacific"

The Progressive

UNION PACIFIC RAILROAD

ROAD OF THE *Streamliners* AND THE *Challengers*

READY!

Every pound of UNITED BLACKS is ready when it leaves the plant for an exacting job ahead. A wealth of manufacturing experience, together with careful supervision and scientific control, has made UNITED BLACKS the talk of the rubber industry for enviable performance. So,—standardize on UNITED BLACKS for top quality, uniformity, and dependability.

UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO

DESIGNED FOR HANDLING

UNITED BAGS claim attention everywhere with their distinctive colored markings. Each type—SRF, HMF, EPC—is the answer for the exacting compounder and is acclaimed for performance in the millroom and on the road. Standardize on UNITED BLACKS to attain perfection in rubber products.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

A NEW PROCESSING AID

R B H
RESIN 510

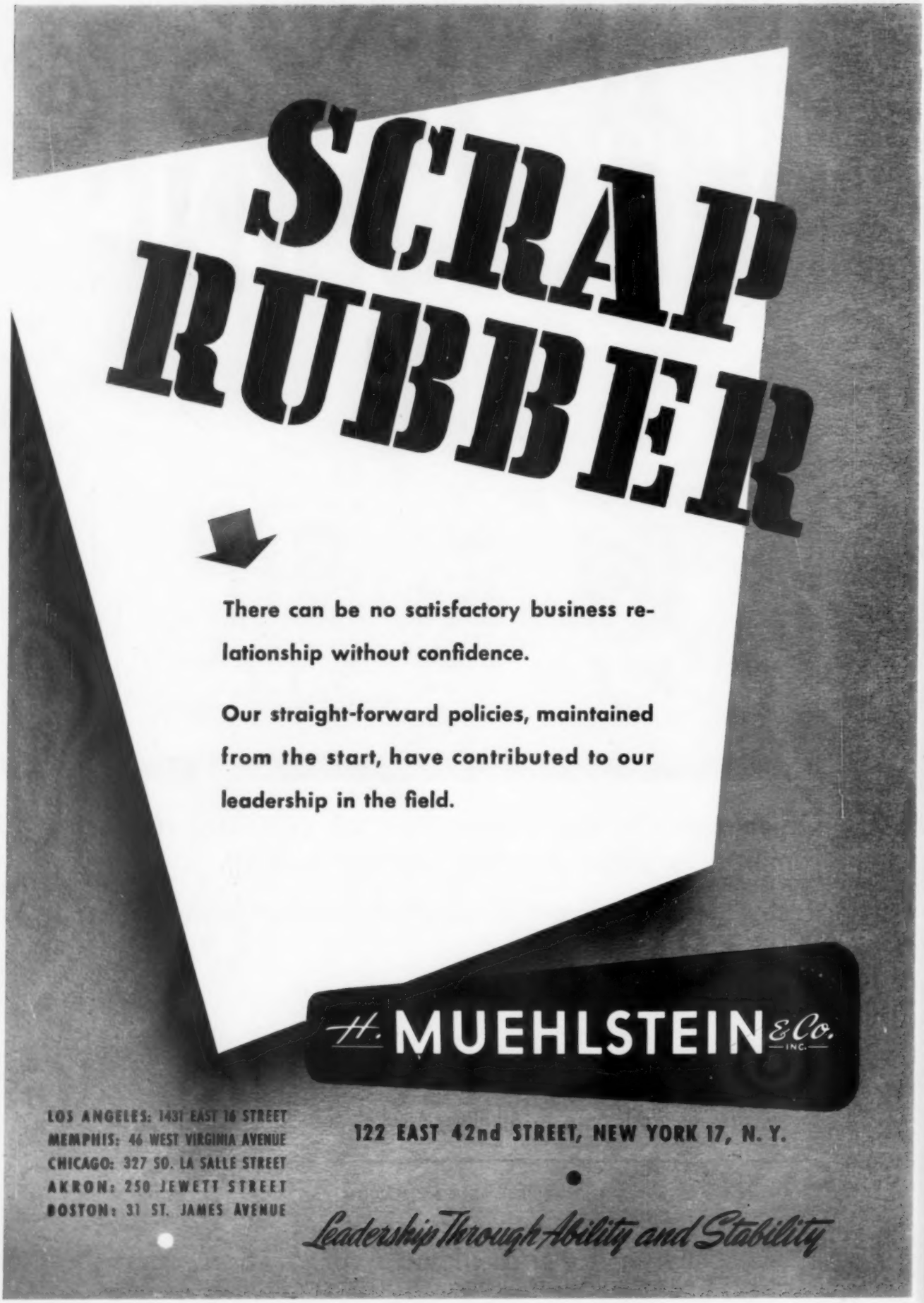
which permits the preparation of synthetic rubber cements by direct solution without milling.

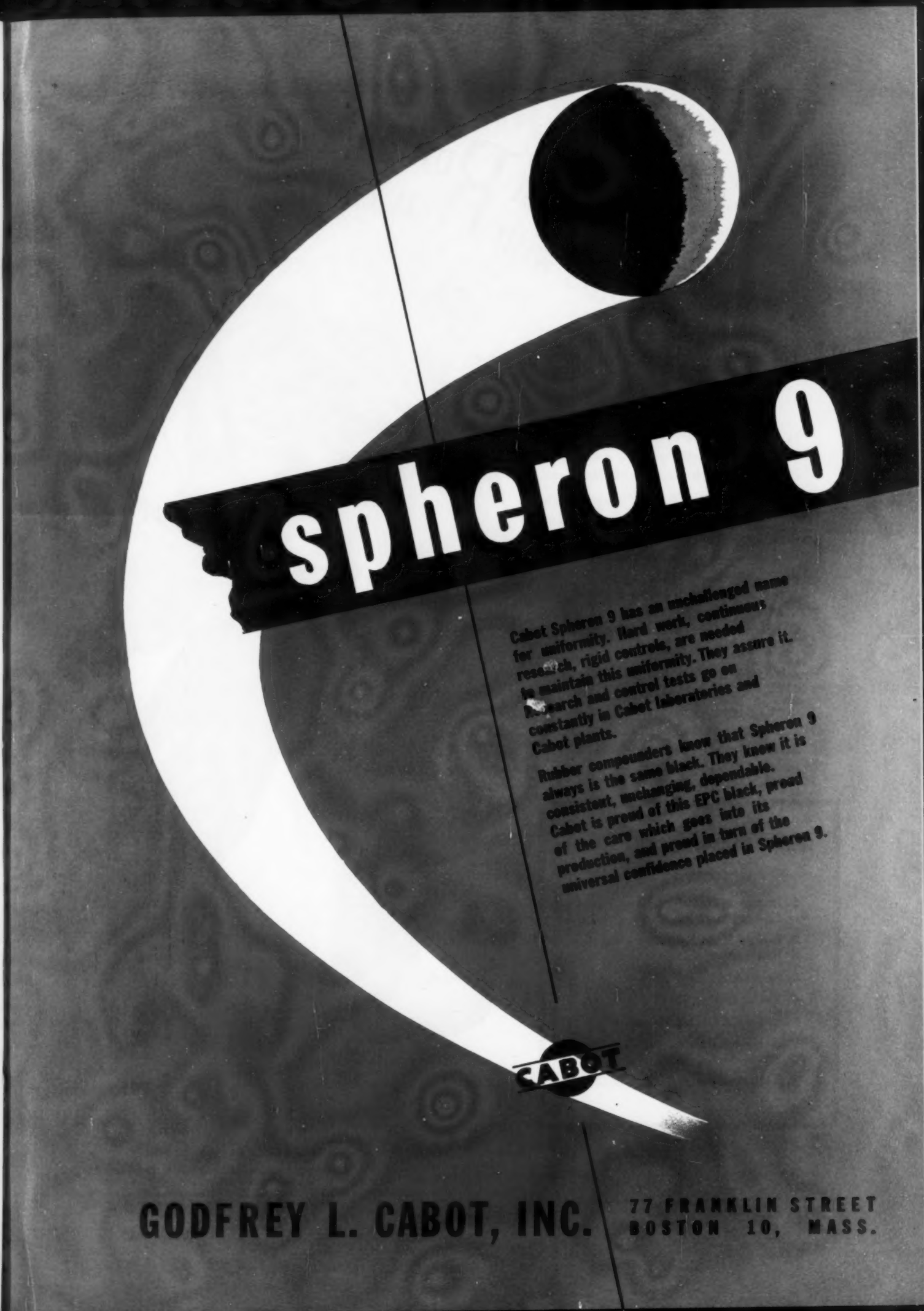
Resin 510 will improve synthetic rubber cements in the following respects:

- Adhesion
- Aging
- Heat Stability
- Film Strength
- Solvent Release
- Reduction of Nerve
- Resistance to Alkalies, Alcohol and Water

FOR PRICES, FURTHER TECHNICAL INFORMATION AND SAMPLES WRITE

R-B-H DISPERSIONS
DIVISION OF INTERCHEMICAL CORPORATION
BOUND BROOK, NEW JERSEY


SCRAP RUBBER
There can be no satisfactory business relationship without confidence.
Our straight-forward policies, maintained from the start, have contributed to our leadership in the field.
H. MUEHLSTEIN & Co. INC.
LOS ANGELES: 1431 EAST 16 STREET
MEMPHIS: 46 WEST VIRGINIA AVENUE
CHICAGO: 327 SO. LA SALLE STREET
AKRON: 250 JEWETT STREET
BOSTON: 31 ST. JAMES AVENUE
122 EAST 42nd STREET, NEW YORK 17, N. Y.
Leadership Through Ability and Stability


spheron 9
Cabot Spheron 9 has an unchallenged name for uniformity. Hard work, continuous research, rigid controls, are needed to maintain this uniformity. They assure it. Research and control tests go on constantly in Cabot laboratories and Cabot plants.
Rubber compounders know that Spheron 9 always is the same black. They know it is consistent, unchanging, dependable. Cabot is proud of this EPC black, proud of the care which goes into its production, and proud in turn of the universal confidence placed in Spheron 9.
CABOT
GODFREY L. CABOT, INC.
77 FRANKLIN STREET
BOSTON 10, MASS.

"If it's made with RUBBER ...it's better made with RED LEAD"

It's true of nearly every product... tires or toys or duck decoys...*if it's made with Rubber, it's better made with Red Lead.*

Extensive tests... confirmed by the experience of users... have established that compounding rubber with #2 RM Red Lead offers the definite advantages listed below. Some of these benefits apply to *your* business—regardless of whether you are working with GR-S, GR-S-10, GR-M, GR-A, GR-I, natural rubber or vinyl elastomers.

Technical literature and counsel on your specific application will be supplied upon request to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, New York.

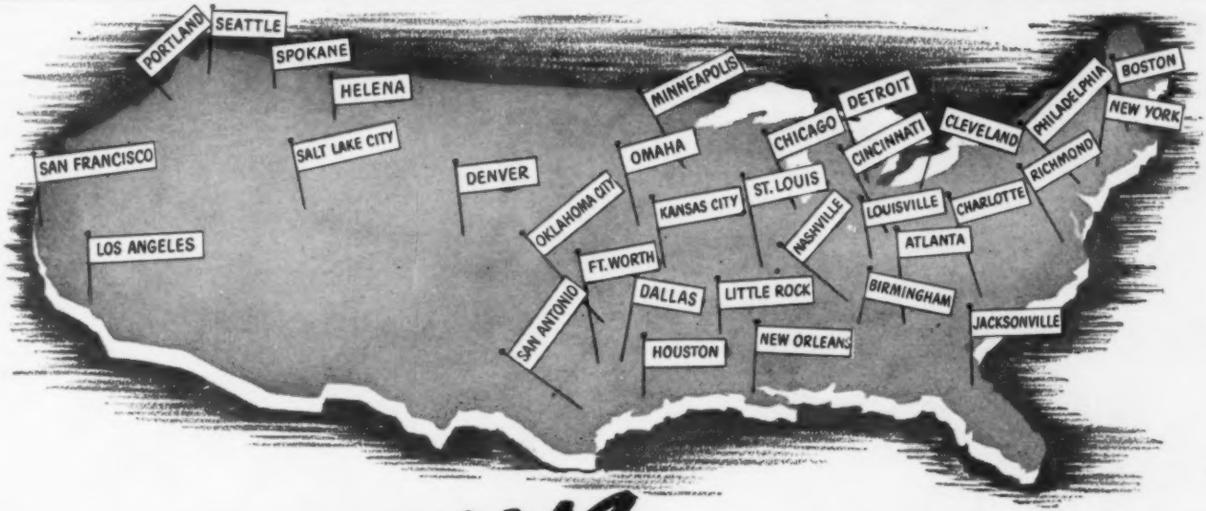
COMPOUND RUBBER WITH #2 RM RED LEAD FOR THESE GOOD REASONS

1. Improved Heat Stability—Retention of Elasticity
2. Lower Heat Build-up—Cooler Running
3. Economical
4. Faster Curing Rate
5. Extended Curing Range
6. Excellent General Physical Properties
7. Safe Processing

NATIONAL LEAD COMPANY

New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W.Va., (Evans Lead Division).

GOVERNMENT-OWNED SURPLUS PROPERTY



33 BUYING SOURCES FOR INDUSTRIAL CHEMICALS

TYPICAL MONEY-SAVING BUYS

Acetone
Acids
Chlorinated Paraffine (approx. 40% & 70%)
Gas cylinders (all types)
Hexachloroethane
Calcium carbide
Methyl bromide
Dyes
Plastic materials
Solvents
Sealing compounds
Petroleum catalysts
Activated charcoal
Silica gel
Calcium chloride
Strontium oxides
Dimethylaniline
Copper naphthenate
Synthetic & natural glues
Printing inks (black & colors)
and most other chemicals

FROM acetone to xylol, the War Assets Administration is disposing of hundreds of surplus industrial chemicals at below market prices. To realize these savings for your business, write, wire or phone the nearest Regional Office, listed below, today. Items not available in your Region will be located for you through the special Inter-office Product Location service.

All items are being sold below current market price. Credit terms may be arranged. Make it *your* habit to check this source when your chemical stocks need replenishing.

All chemicals are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the WAA certifying office serving your area and then to purchase the material offered herein.

EXPORTERS:

Most surplus property is available to the export market. Merchandise in short supply is withheld from export and if such items appear in this advertisement, they will be so identified by an asterisk.

FREE FACTS

War Assets Administration (address nearest Regional Office)

Please supply, without obligation, prices, available quantities and locations of items written in below:

....
....
....
.....

Name.....

Firm.....

Address.....

City.....Phone.....

155-3

WAR ASSETS ADMINISTRATION

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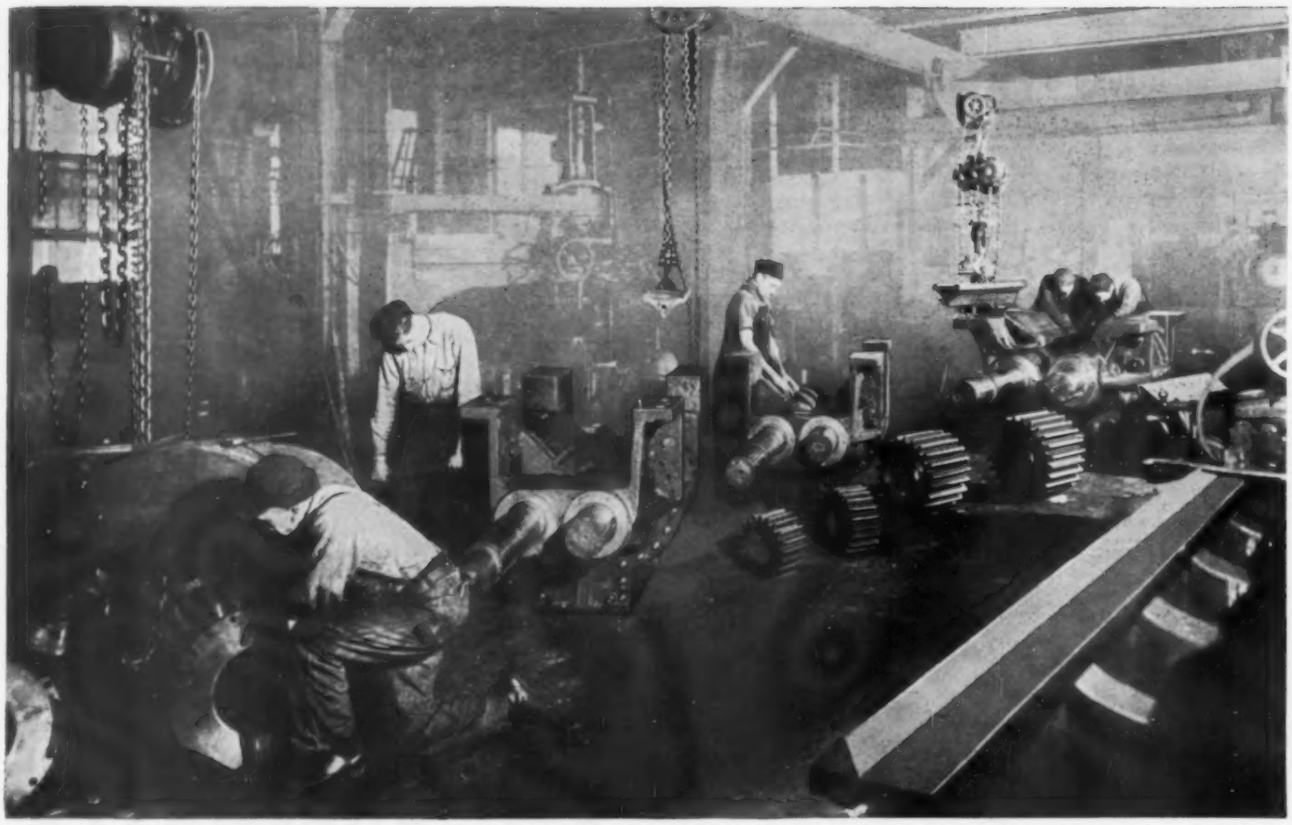

The Service That Steps Up Your Mixing Room Output

YOU KNOW increased production, faster delivery, of rubber goods *begins* in the Mixing Room, and *depends* a lot upon the condition of the Banbury equipment.

Work-worn, faltering Banbury Mixers are a drag against output, a menace to quality, a potential cause of costly breakdowns.

Well . . . you are looking right at the way to avoid all such hazards:—the way to have *full* Banbury efficiency: — JUST CALL ON INTERSTATE.

Putting Banburys in tip-top condition, able to whip today's tougher compounding schedules, is our exclusive job—and has been for more than a dozen years.

Our production line is "going" day and night, manned by Banbury Specialists, thoroughly qualified and experienced in repairing, or rebuilding. The illustration above shows four Banburys in our Plant, on the road back to 100% efficiency.

We can help *you* get the *maximum* output from your Banburys. Write, wire or phone us at once.

SERVING THE RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

SHELL DUTREX 6

Plasticizer and Extender for GR—S

Chemically and physically Controlled

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SHELL OIL COMPANY OF CANADA, LTD., 25 ADELAIDE ST., EAST TORONTO, CANADA
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A witches' brew

... to feed huge industries!

Bubble crowds bubble in this agitated and constantly overflowing brew. The fact that no heat is reflected from this seemingly boiling mass, evokes visions of witches mumbling incantations over mysteriously bubbling cauldrons.

● In reality, the picture shows a section of a flotation tank in the Balmat mill of the St. Joseph Lead Company's zinc mines in northern New York State. The flotation process is one of the first steps in the production of St. Joe lead-free Zinc Oxides for the huge industries engaged in the manufacture of rubber, paint and other zinc oxide-containing products. The bubbles emanating from the roiling liquid, rise from the bottom of the huge tank containing zinc ore. This has previously been crushed and ground to the size of sand which is mixed with water and precisely controlled combinations of chemical reagents. Besides zinc, the pulp contains lead and iron pyrites; it is agitated in the flotation machines by forcing air to the bottom of the tank. The first combination of chemical reagents makes the lead sulphide adhere to the bubbles and overflow at the top; the next combination "floats" the zinc sulphide, and the final circuit "floats" the iron pyrites concentrates.

After filtering and drying, the zinc concentrates, averaging 57% zinc, are shipped to the Company's Josephtown, Pa. smelter where they are converted into zinc oxide by a patented electro-thermic process. The flexibility of this process—exclusive with this Company—is largely responsible for that high degree of purity and uniformity which has always been a distinguishing feature of St. Joe lead-free Zinc Oxides.

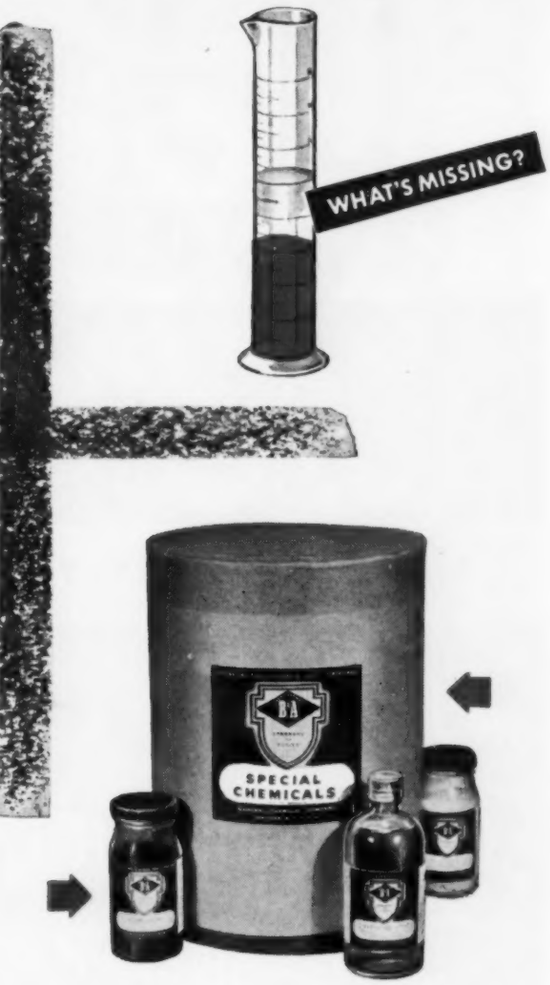
ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • New York 17, N. Y. • Eldorado 5-3200

ST. JOE *Lead-Free* ZINC OXIDE

MADE BY THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES

with 64 years' experience making special chemicals —B&A may have the answer to your problems



Over the past 64 years, Baker & Adamson has helped Industry solve scores of production problems by providing a wide range of fine chemicals "custom made" to the particular requirements of individual users.

Such experience can be invaluable to you, too, if your research, development or production program indicates a special chemical will be needed.

Whether you must have this material "made to order" in tons or pounds, you will find B&A's flexible manufacturing facilities well adapted to countless assignments . . . and your special chemical will be produced with the same skill, science and careful attention that has gained B&A the reputation for "setting the pace in chemical purity" wherever reagents and fine chemicals are used.

Remember—no matter what your needs, the Baker & Adamson Division of General Chemical Company has the men, methods, and materials to handle special chemical requirements swiftly, surely . . . and in strictest confidence.

Let us discuss your problem now so as to dovetail the delivery of your special chemical to the flow of your other production materials.

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B&A
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FINE CHEMICALS

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SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks carried here.

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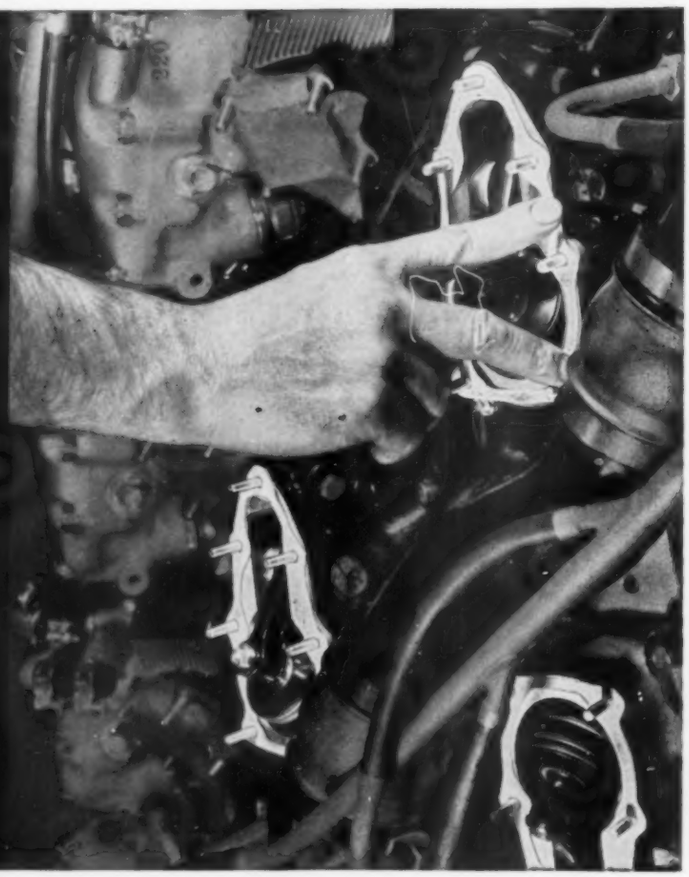
SILICONES

SILASTIC
FLUIDS
VARNISHES
RESINS
GREASES

withstand heat
resist oxidation
exclude moisture

SILASTIC* GASKETS

for the most powerful aircraft engine ever built!



chosen best among all gasket materials tested for service at 450°F.

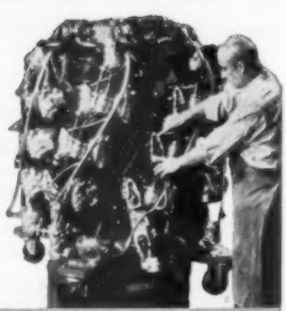
"NOTHING BUT THE BEST!" That's the policy followed by Pratt & Whitney in selecting materials for the powerful new 28-cylinder, 3650 h.p. Wasp Major.

That's why Silastic was chosen for these rocker box gaskets. Factors in the choice were Silastic's resiliency at the 450°F. operating temperature, resistance to the hot oil, and convenience in handling.

Silastic will fly with the Wasp Major in such giant new airliners as the Boeing Stratocruiser, Douglas Globemaster, Martin Mars, and Republic Rainbow.

If you need a rubber-like material that's resilient up to 500°F. and flexible down to −70°F., call for "Silastic Facts" No. 1A—and *TRY SILASTIC!*

*Trade Mark, Dow Corning Corporation



Silastic gaskets fabricated from Dow Corning silicone rubber by the Connecticut Hard Rubber Co. seal 56 rocker boxes of the 28-cylinder Pratt & Whitney Wasp Major.

Dow Corning

FIRST IN SILICONES

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uniformity makes the big difference

GET MORE SUCCESSFUL FABRICATION WITH THESE MORE UNIFORM FABRICS

Successful fabrication of your rubber products is largely contingent on the degree of uniformity in the fabric you employ. MT. VERNON fabrics *have* this uniformity . . . an undeviating quality attained by a rigid system of laboratory control that checks every step of their production. For fabric uniformity that insures more efficient fabrication of your rubber products, specify MT. VERNON Fabrics.

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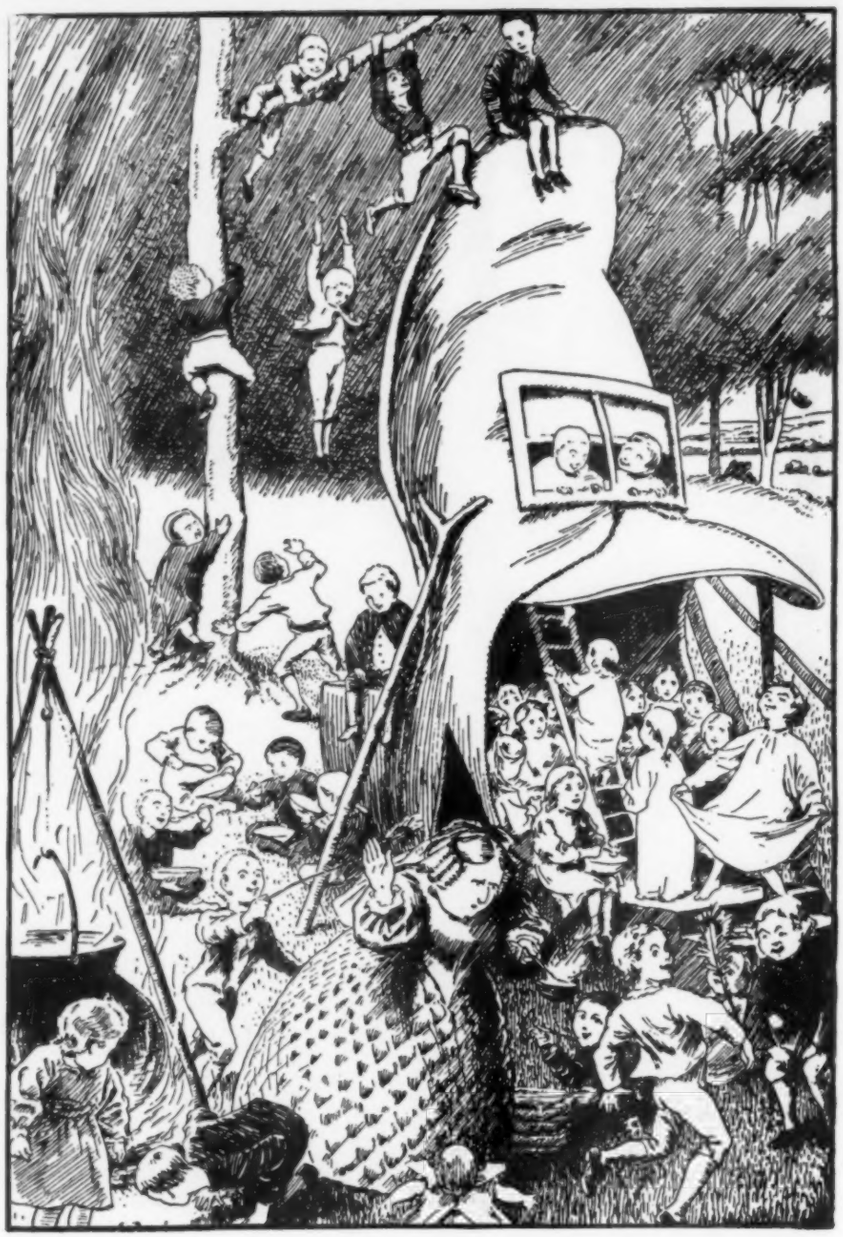
THE OLD LADY WHO LIVED IN A SHOE



A unique way to solve the housing problem would be to follow the old lady's example with the added advantage that today's rubber footwear in which PELLETEX is used combines a comfortable resiliency with exceptional wear. For both natural and synthetics, PELLETEX, leading semi-reinforcing furnace black is economical and easy to process.

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RUBBER

H AND M

PIGMENTS Chemicals

the reel way to tire yarn

In the textile world, Industrial's "Continuous Process" for producing superior rayon yarn has long been famous.

When the demand came for high tenacity rayon tire yarn, a new chapter was added to the story of this versatile machine. This chapter deals with stretching the yarn to reduce elongation and increase strength as well as applying the finish that prepares the yarn prior to its wedding with rubber.

By conventional methods of rayon production, high tenacity yarn must be slasher-stretched and finished after the yarn is collected into a package. That requires putting these spinning packages on creels and processing the yarn as it passes through the slasher to be wound up on beams.

But, as a result of the individual thread treatment afforded by the "Continuous Process," Industrial's Tyron yarn is completely stretched and finished as it passes over the thread advancing reels.

When it is wound on bobbins at the last stage of the machine, it can go directly to twisters to be UP-twisted into tough Tyron cord. Thus, not only are the characteristic qualities of "Continuous Process" production retained but an entire extra operation is eliminated, and a more efficient cord twisting method can be employed.

Though this chapter is new, it echoes the theme of preceding ones—for improved product and increased efficiency in rayon production, look to Industrial!

Send for your copy of "ROLLING ON RAYON"

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NEW YORK OFFICE 500 FIFTH AVE

MAKERS OF

*Spun-lo RAYON YARN AND CLOTH and *TYRON YARN, CORD AND FABRIC

*Reg. U. S. Pat. Off.

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Improving Old Ones?

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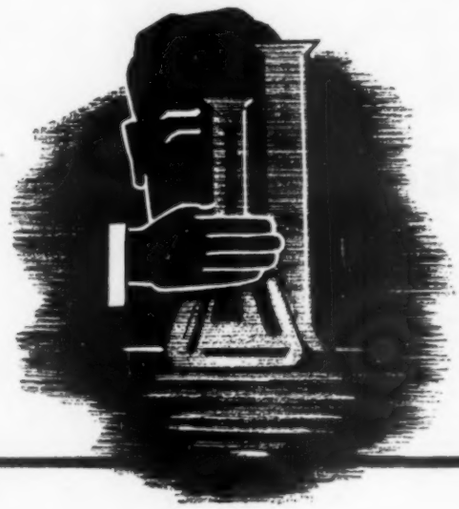

What grade of material will be best in that new product?

What's the best substitute for an unobtainable pigment?

We have stiff competition to buck. What's better and cheaper than what we've been using?

To help you answer just such questions, the Whittaker Research Division places at your service its extensive facilities and its accumulated knowledge of minerals, colors and pigments.

Whittaker research has helped solve lots of these problems. It has been most active when most needed. In answer to the serious need of the leather, optical, soap, and other industries, for instance, Whittaker discovered, developed and distributed *Valencia* pumice from the large deposit at Grants, New Mexico and this Whittaker product has proved superior to Italian pumice for all purposes.

Whittaker is manned and equipped to accept the challenge of your problems, too. Possibly one or several of the Whittaker minerals, colors and pigments may mean lower cost, faster manufacture or better quality in your products. Let Whittaker research help you find out. Write for full technical data, laboratory samples, or advice. For commercial quantities, place your order with Whittaker, fully assured of getting products that are laboratory tested for uniform high quality.

— Imported pigments and colors have returned —

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WHITTAKER EST. 1890

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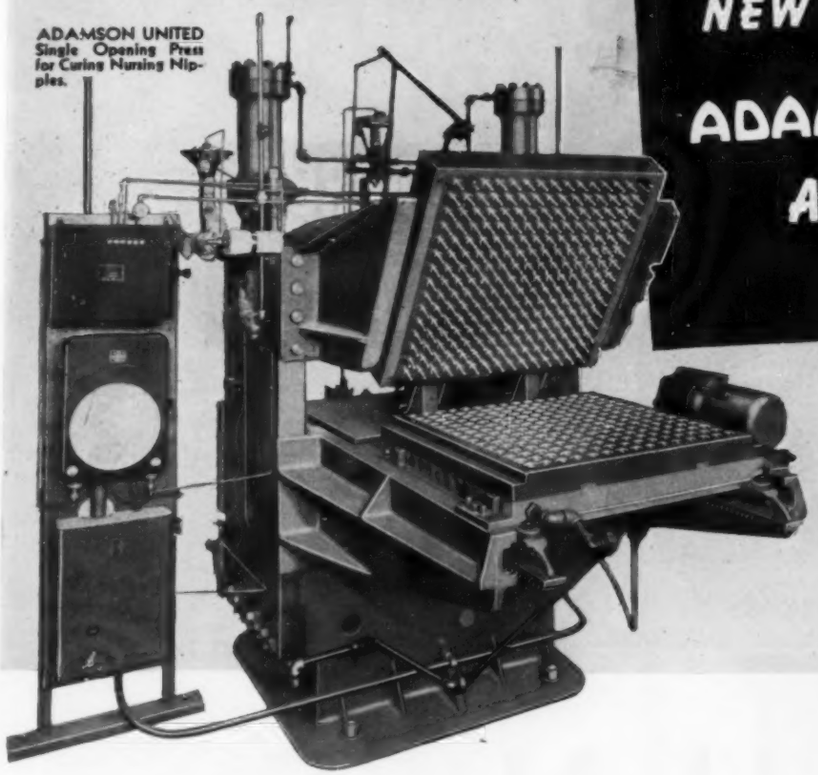
FOR MOLDED GOODS...

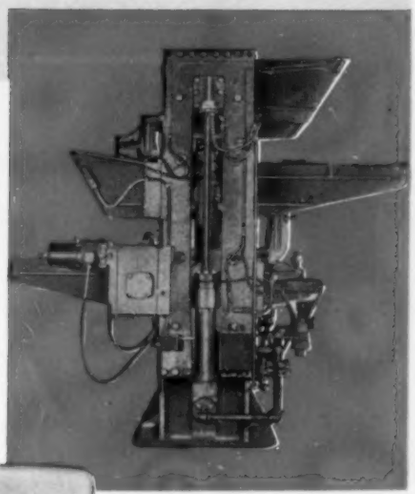
NEW AND IMPROVED

ADAMSON UNITED AUTOMATIC PRESSES



ADAMSON UNITED Single Opening Press for Curing Nursing Nipples.

- √ Eliminate Mold Handling
- √ Shorten Cure Time
- √ Increase Production



Fully automatic, yet possessing all the advantages of conventional presses for precision molding, these New ADAMSON UNITED Single or Double Opening Automatics have, in many instances, stepped up production as much as 50%.

Operation is extremely simple with practically all manual effort eliminated. There is no more tugging or handling of heavy molds. The operator has only to load the molds and press a push button. The press closes and at the expiration of the cure, push-back cylinders part the molds. Knockouts eject the cured articles from the mold cavities and the platens move out to a position from which the operator may easily strip the mold and reload.

A new, powerful but simple rack and pinion drive provides smooth, quiet operation. Presses may be furnished in sizes to take molds from 24" x 24" to 46" x 46".

Further details on AUTOMATIC PRESSES and other ADAMSON UNITED rubber, synthetics and plastics machinery and processing equipment will be mailed upon request. Your inquiry entails no obligation.

ADAMSON UNITED Double Opening Automatic Press. Side view showing motor and brackets. Upper bracket causes mold to travel upward at an angle . . . lower bracket allows lower half of mold to move out horizontally.

ADAMSON UNITED 20" x 20" Streamlined Laboratory Press equipped with motor and oil hydraulic unit. Instrument board is provided with press controls and indicator for registering platen temperature. This unit is now in service in one of the country's largest research laboratories.

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AKRON, OHIO

DISTRICT SALES OFFICES:
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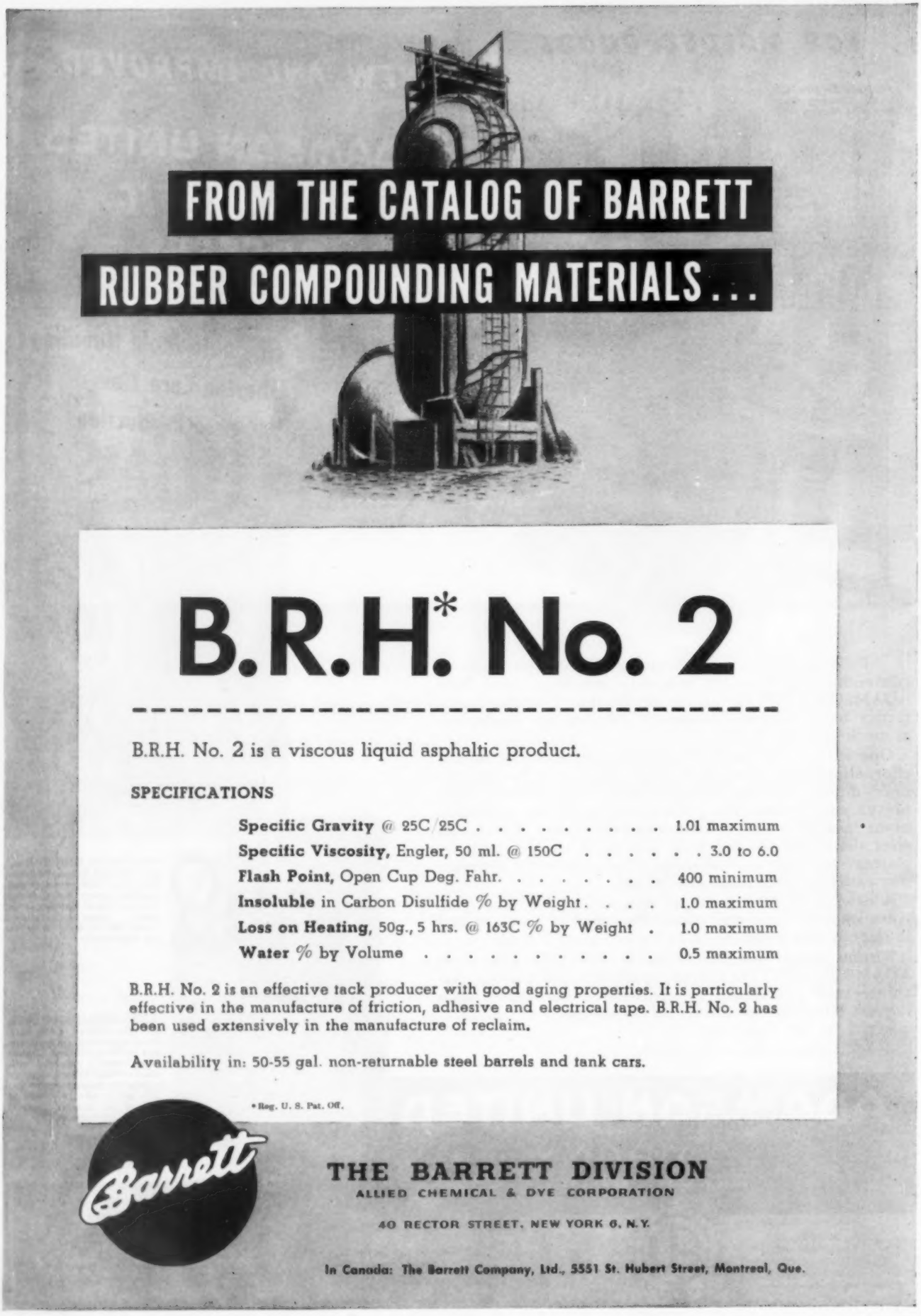

B.R.H.* No. 2

B.R.H. No. 2 is a viscous liquid asphaltic product.

SPECIFICATIONS

Specific Gravity @ 25C/25C	1.01 maximum
Specific Viscosity, Engler, 50 ml. @ 150C	3.0 to 6.0
Flash Point, Open Cup Deg. Fahr.	400 minimum
Insoluble in Carbon Disulfide % by Weight	1.0 maximum
Loss on Heating, 50g., 5 hrs. @ 163C % by Weight	1.0 maximum
Water % by Volume	0.5 maximum

B.R.H. No. 2 is an effective tack producer with good aging properties. It is particularly effective in the manufacture of friction, adhesive and electrical tape. B.R.H. No. 2 has been used extensively in the manufacture of reclaim.

Availability in: 50-55 gal. non-returnable steel barrels and tank cars.

*Reg. U. S. Pat. Off.

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A Complete Line of Approved Compounding Materials

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WHOLE TIRE
RECLAIM

Another Pequanoc Quality Standard

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Low Gravity • High Tensile
Laboratory Controlled

★

Calenders and Tubes Well
Cuts Compounding
and Processing Costs!

★

This addition to the Pequanoc line of reclaim has many uses and in the not too distant future will be produced in volume to meet your requirements.

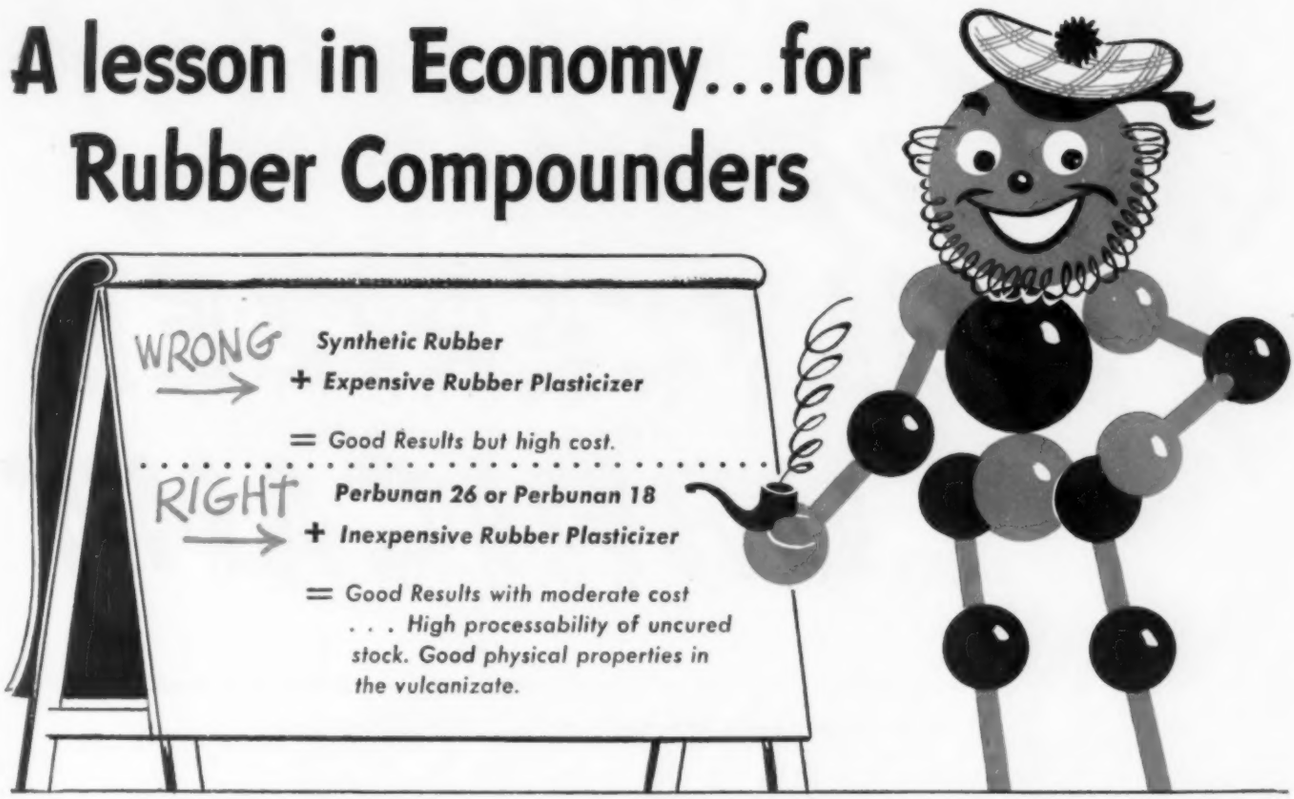
★

PEQUANOC RUBBER CO.

QUALITY RECLAIMS FOR SPECIFIC PURPOSES

BUTLER NEW JERSEY

A lesson in Economy...for Rubber Compounders


WRONG
Synthetic Rubber
+ Expensive Rubber Plasticizer
= Good Results but high cost.
RIGHT
Perbunan 26 or Perbunan 18
+ Inexpensive Rubber Plasticizer
= Good Results with moderate cost . . . High processability of uncured stock. Good physical properties in the vulcanizate.

Comparison of Perbunan 18 with Perbunan 26 Using a Low Cost Petroleum Derivative Plasticizer

Recipe	
Perbunan	100.0
Zinc Oxide	5.0
Stearic Acid	1.0
Medium Processing Channel Black	50.0
Lopor 42*	20.0
Benzothiazyl Disulfide	1.0
Sulfur	2.0

*Lopor 42 properties are: Specific Gravity 0.9059; A.P.I. Gravity 24.7; Flash Point 365F and Aniline Point 175F. This product costs approximately $0.035 per pound.

Check these compound comparisons carefully. These and other Perbunan Compounds can be used where *oil resistance, durability* and *economy* are necessary.

PERBUNAN

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

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PHYSICAL PROPERTIES		PERBUNAN 18	PERBUNAN 26
UNCURED STOCK			
Mooney Viscosity (ML)	1½ minutes at 212F	38	49
Extruded Appearance		Very Smooth	Smooth
STOCK CURED 60 MINUTES AT 287 DEGREES FAHRENHEIT			
Rebound at 40 degrees centigrade in per cent		49.0	54.1
Compression Set under Constant Deflection of 30 per cent for 22 hours at 158F in per cent		40.2	41.9
Low Temperature Brittleness Test Passed at degrees Fahrenheit		—40	—40
Hardness and Stress-Strain Properties Original			
Shore Hardness		49	53
Tensile Strength in psi		2965	2995
Elongation in per cent		735	645
Modulus at 300 per cent Elongation in per cent		570	710
Aged at 212 degrees Fahrenheit for 70 hours			
Shore Hardness		73	63
Tensile Strength in psi		2625	2815
Elongation in per cent		265	275
Aged in ASTM Test Oil No. 3 at 212F for 70 hours			
Shore Hardness		36	52
Tensile Strength in psi		960	1995
Elongation in per cent		305	225
Volume Increase in per cent on Immersion in:			
40 per cent Aromatic Test Fluid SR-6 at Room Temp for 48 hr		83	56
Gasoline Test Fluid SR-10 at Room Temp for 48 hr		32	13
ASTM Test Oil No. 3 at 212F for 70 hr		33	16

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Versatile!

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(LIQUID CONCENTRATE)

LUBRICANT

Whether you have a "Dust" nuisance to be corrected in treating hot rubber slabs to prevent adhesion in piling . . .

. . . . or an extruding operation that needs speeding up of tubing for the flat pan cure or continuous running . . .

. . . . or a molding problem—lubrication of mandrels and cores—belt drums—air bags—processing of insulated wire and cable—in fact, almost any lubricating need in the processing of rubber can be vastly facilitated with applications of GLYCERIZED LIQUID LUBRICANT!

. . . . when inner tubes are coated with GLYCERIZED, growth is reduced and modulus is maintained at high value with decidedly lower tensile depreciation under severe service. GLYCERIZED tends to minimize friction, permits slipping and placing into tire easily *(avoiding pinches)* with the added property of preservation and rich, satiny finish.

Glycerized is truly a Versatile Lubricant of unparalleled processing and finishing qualities for all types of synthetic rubbers as well as for natural rubber, reclaim or mixture thereof.

GET THE GENUINE from GENSEKE

AVAILABLE ONLY IN DRUMS, HALF DRUMS AND QUARTER DRUMS

QUALITY SINCE 1884

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RUBBER MATERIALS DIVISION

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AND

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AERO* BRAND DPG

OVER 99% PURE DIPHENYLGUANIDINE

AERO BRAND DPG and other Cyanamid "controlled quality" chemicals are helping processors to establish and maintain fast, economical, dependable processing schedules. Quick deliveries can be made to all centers of the rubber industry.

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AMERICAN CYANAMID & CHEMICAL CORPORATION

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Cable and Wire
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A practical approach to the use of synthetic dispersions in your product is to refer your problem to our laboratory. No matter what the process—coating, impregnating, or bonding—our experienced technical staff can compound the material best suited to your requirements. In the case of an entirely new product, we will work out all the details of manufacturing procedure—from pilot operations to commercial production in your plant. Why not talk it over with one of our technical representatives?

GRS latex types 2 and 3, normal and concentrated, available from stock.

A Complete Service to Manufacturers

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Agents for Rubber Reserve Company for storage and distribution of natural rubber latex. Distributors for Rubber Reserve Company for synthetic latex. Operators of the Government-owned Baytown, Texas, synthetic rubber plant in collaboration with the General Tire & Rubber Co.

it's your move to Color...

THE RETURN of red tubes from war-time oblivion is setting the pattern for *moves to color* in many directions... In Drug Sundries, Mechanical Goods, and Footwear, COLOR will stimulate the change to stable peace-time markets... The return of white side-wall tires is a looming event for 1946... In all of these production trends SILENE EF is a dominant factor because it is assuring greater success in color compounding... SILENE EF is essential in many non-black compounds of natural or synthetic rubber to give them the needed processing and good cured physical properties unobtainable when whitings or clays are used alone as the loading pigment.

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TO RELEASE MOLDED RUBBER ECONOMICALLY

USE COLITE CONCENTRATE . . . *A High Quality Concentrated Liquid Mold and Mandrel Lubricant*

- Results in a shiny, satin-like finish.
- Never builds up on the molds.
- Is extremely *economical.*
- Is non-toxic, non-tacky, odorless.

Write today for further information on the Colite Concentrate way of removing cured rubber and plastics from molds

For brighter white goods, Colite D43D is recommended.

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For Every Natural or Synthetic
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UNITED ROLLS

All Types... All Sizes For Washers • Crackers • Refiners • Mills • Calenders

UNITED has been making rolls for the rubber processing industry for more than 30 years. Hundreds are in daily use in outstanding processing plants throughout the world.

Our engineers specialize in meeting the rubber industry's roll requirements whether for conventional or unusual applications. Their abilities and experience, plus the productive capacity of six great plants, are at your service.

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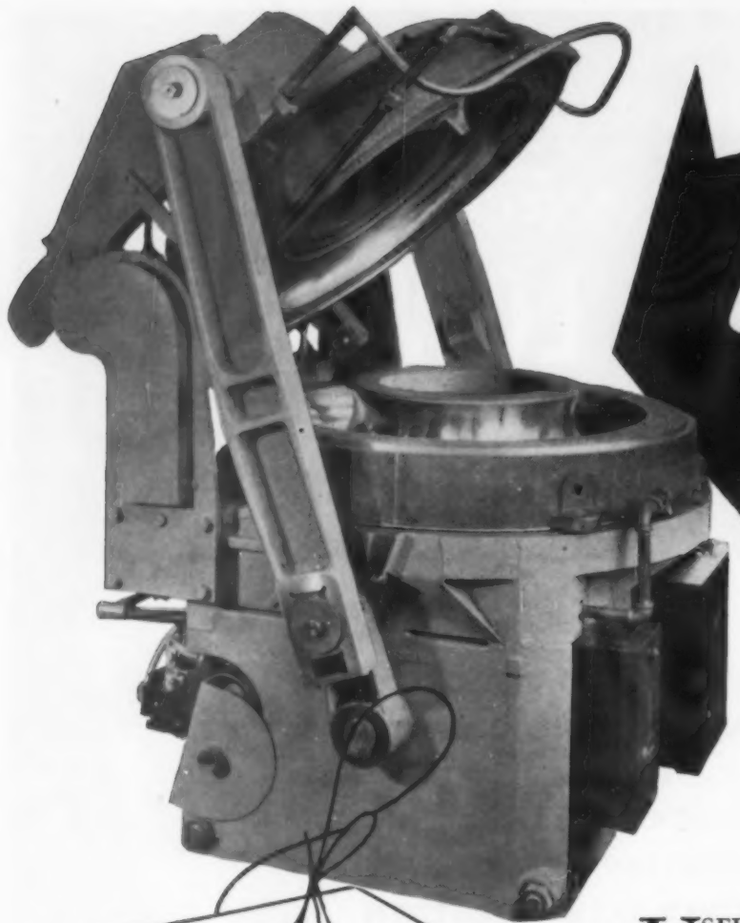

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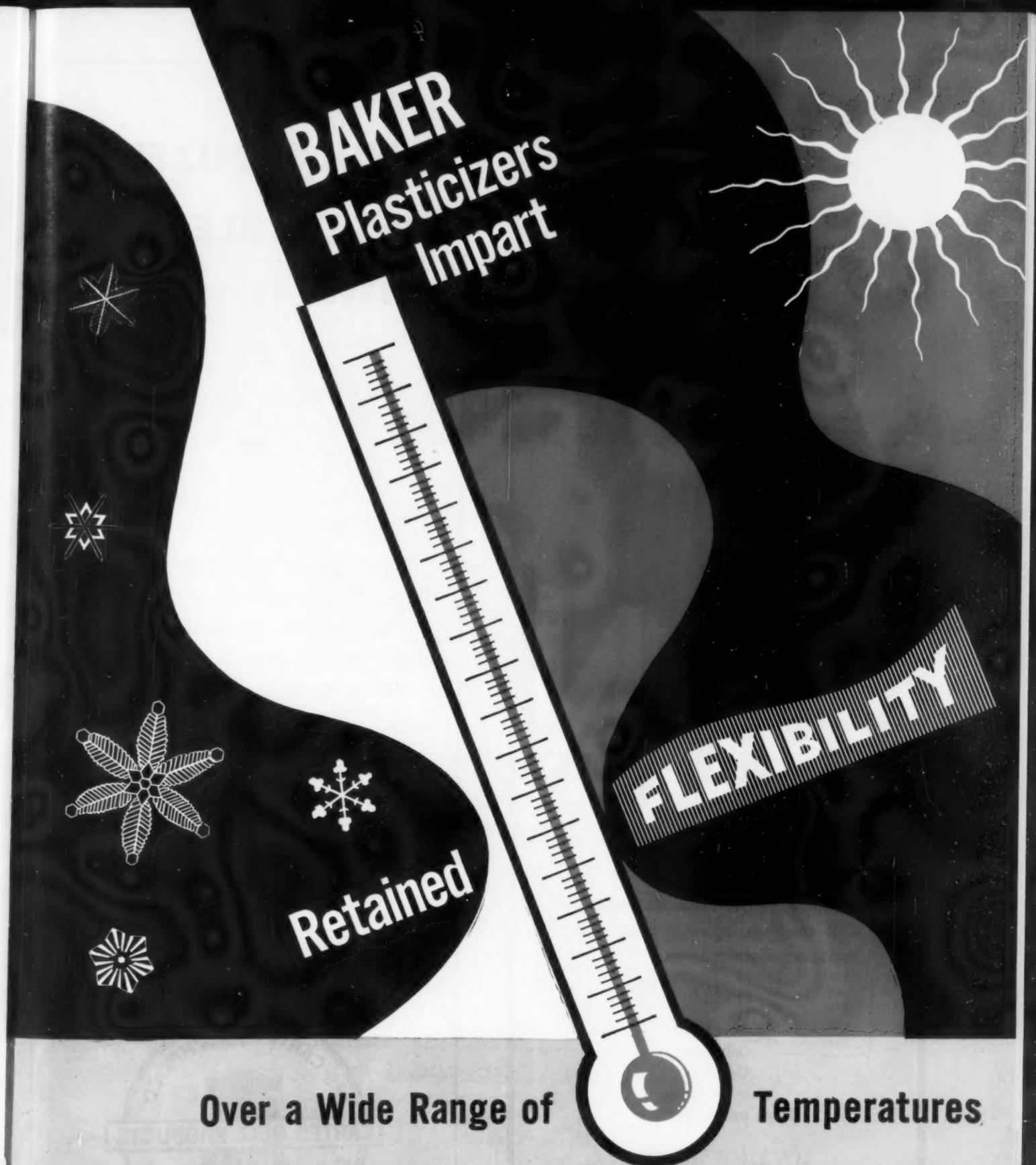

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Cure	Parts/100 Neoprene		Original				Comp.	Oven Aged 70 Hrs. at 212°F.			
at 316°F	639½	SRF Black	Tensile	Elong.	Hard.	Tear	Set	Tensile	Elong.	Hard.	Tear
50′	87.5	175	1355	285	55	225	31.3	1500	280	65	189
50′	75	150	1325	275	56	254	24.5	1420	250	60	243
40′	75	200	1500	170	70	207	24.75	1655	160	75	200
40′	93.75	237.5	1285	200	72	214	32.45	1500	180	76	470
40′	87.5	225	1275	200	77	164	40.1	1165	165	82	189
50′	87.5	250	1240	150	85	176	47.0	1180	115	90	175
40′	100	300	1140	160	86	178	44.3	1190	130	86	162
50′	75	300	1115	——	96	194	62.0	1400	40	96	165

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Technical Bulletin No. 23 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

Superaging GR-S Compounds

The Effect of Additional Antioxidant

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus—Load (psi) for Elongation of: 200%	300%	400%	500%	Permanent Set	Shore Hardness
NO ADDITIONAL ANTIOXIDANT								
4	2020	685	185	300	410	675	.23	45
7.5	2040	655	190	270	385	655	.23	47
15	1770	615	225	300	415	715	.19	48
30	2150	625	225	300	450	755	.20	48
45	1640	600	230	305	455	725	.17	48
60	1770	600	225	300	450	795	.17	48
90	1750	600	230	265	420	685	.16	48
WITH THE ADDITION OF 3 PARTS AGERITE WHITE								
4	2330	690	235	310	465	740	.31	47
7.5	2420	670	230	345	425	770	.28	49
15	1980	630	230	305	455	800	.22	49
30	2060	630	230	340	495	800	.21	49
45	2020	630	230	340	455	800	.21	49
60	1980	620	230	340	495	760	.20	49
90	1870	615	230	340	455	760	.21	49

AFTER 20-HR. AIR PRESSURE HEAT TEST*

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus—Load (psi) for Elongation of: 100%	200%	300%	400%	500%	Permanent Set
NO ADDITIONAL ANTIOXIDANT								
4	1160	355	300	525	785	...	...	.07
7.5	1170	365	265	490	715	...	...	.08
15	1385	425	230	425	615	1075	...	.12
30	1690	490	230	425	540	885	...	.17
45	1580	510	230	385	540	810	1540	.16
60	1420	500	230	385	500	730	...	.16
90	1400	515	235	390	505	700	1240	.17
WITH THE ADDITION OF 3 PARTS AGERITE WHITE								
4	1270	340	425	690	1000	...	...	.08
7.5	1360	355	380	680	980	...	...	.10
15	1520	410	340	570	800	1485	...	.13
30	1730	470	310	540	730	1115	...	.19
45	1655	485	310	460	690	1000	...	.19
60	1620	495	270	460	615	960	...	.18
90	1680	530	265	420	610	840	1560	.22

* Test Conditions: 126° C., 80 lb. Air Pressure.

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"El-Sixty"	1.5
"Monex"	0.2
Coumarone-indene Resin	15.0
ELC Magnesia	5.0
Agerite White	As Noted
Zinc Oxide	100.0

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The RUBBER AGE

VOLUME 59

NUMBER 4

One of the World's Outstanding Rubber Journals

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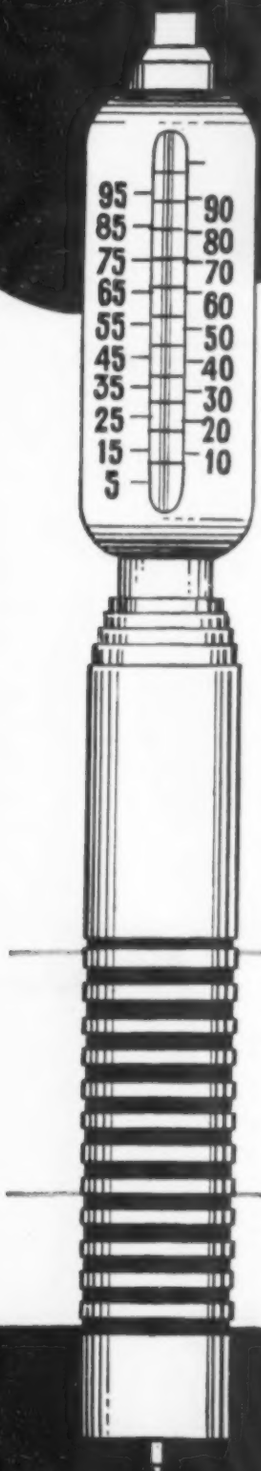

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RUBBER AGE

VOL. 59, No. 4 JULY, 1946

High Frequency Heating in the Rubber and Allied Industries

By G. P. BOSOMWORTH

Manager, Engineering Labs., Firestone Tire & Rubber Co., Akron, Ohio

ELECTRONICS is a relatively new word in industry but its origin is old. It is derived from the Greek work for amber *"electron"* which was suggested by Dr. G. Johnstone Stoney in 1891 *(1)*. It will be noticed in his paper that the word electron is used to signify a definite elementary quantity of electricity. Since that time the work of many scientists has provided the electronic industry of today with basic theories. Their application has improved man's lot and his knowledge of many sciences.

About 1882, Edison, in his work on the electric lamp, discovered that if a plate inserted in the side of a lamp was connected to the positive side of the filament through a galvanometer a current would be indicated as in Figure 1. Since there is no metallic connection between the plate and the filament within the lamp, there must be some flow of electricity within the space between them. In 1899, J. J. Thompson showed that the hot filament gave off electrons or negative particles of electricity.

When Lee De Forrest, in 1907, introduced into the tube a third element, as in Figure 2, and in 1908 made it of a grid form, the modern electronic industry was born. This grid with appropriate potentials was found capable of stopping or of modifying the flow of elec-

Note: This article was presented as a paper before the Division of Rubber Chemistry, Chemical Institute of Canada, at Toronto, Ontario, Canada, on June 25, 1946, and is being published concurrently with *Canadian Chemistry and Process Industries*.

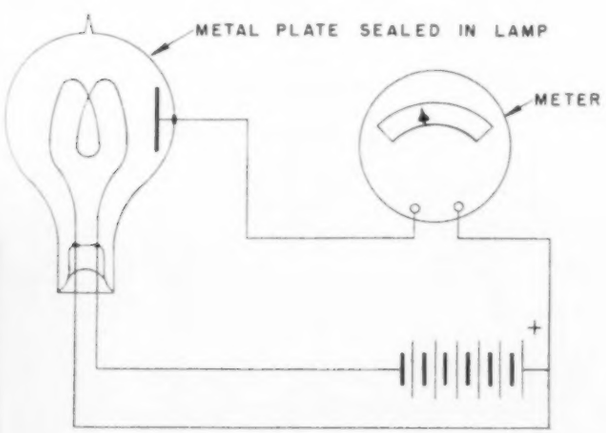


FIG. 1—Edison effect.

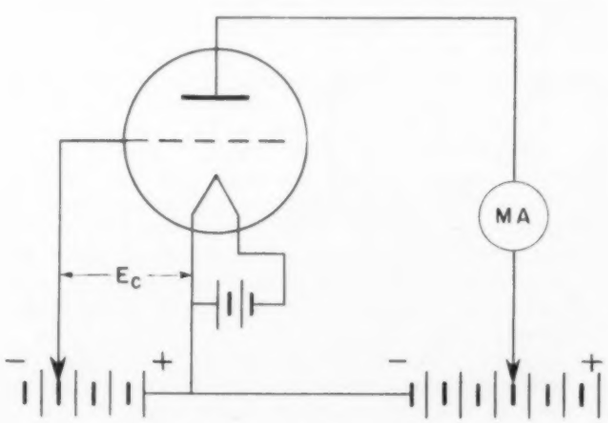


FIG. 2—Triode grid control.

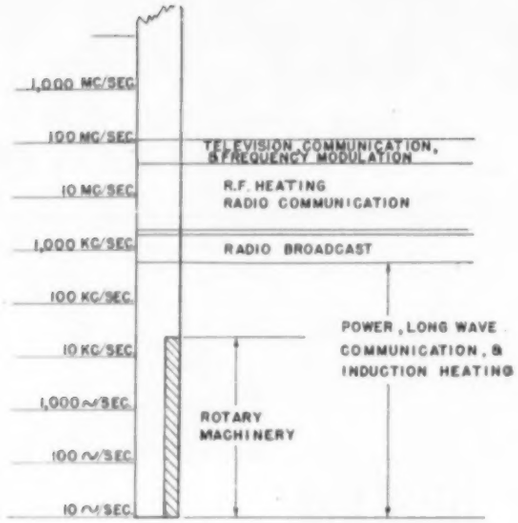


FIG. 3—Frequency spectrum.

trons across the tube with corresponding amplified effects on the plate current.

The work of Fleming and De Forrest started a new era in radio communication, opening up fields that were not available to Hertz in his pioneering days. When De Forrest controlled the flow of electricity outside the confines of a wire he had a new device with unlimited possibilities. It has spread from radio communications to industry. We find this tube, or modifications of it, controlling large motors, welding equipment, measuring small time intervals, making long distance telephone communications possible, and capable of a host of other uses. There is one application in which we are particularly interested at this time. That is its application to the drying and vulcanizing of rubber or plastics. But before we can go ahead on that, a few words on the generation of the power which we use in such processes.

Like the radio transmitter we need frequencies higher than those provided by the local power supply of 50 or 60 cycles per second. A look at the frequency spectrum in Figure 3 will serve to orient the reader.

Figure 3 shows in a very limited manner the spectrum. There is much more to it than is shown in this illustration. Starting at the bottom we have a region devoted to power, induction heating and long wave radio communication. From the lowest frequency to 20,000 cycles per second rotating machinery can be used as the source. Above this we must use the radio tube or spark gap. In the range 540 to 1600 K.C.s we have broadcasting. A little further along we have the area between 2 M.C./sec. and 42 M.C./sec. in which we find the majority of the current applications of dielectric heating. Radio communication services also use this portion of the spectrum. However, more on this phase later.

Induction heating is confined to metals, or good conductors, while dielectric heating is spoken of in terms of insulators. Generators for both types in the higher frequencies are much the same.

In Figure 2 we have a simple amplifier; however, we need a slightly different circuit, as shown in Figure 4. This is one type of an oscillator circuit known as a tuned plate-tuned grid oscillator. In this circuit we have a tube with two inductance-capacity elements which are so designed and adjusted that they determine and maintain the natural frequency of the oscillations produced. We have seen in Figure 2 that a varying voltage on the grid of a tube will produce corresponding, but larger, changes in the plate circuit. If we can feed back some of the energy from the output, or plate tank, circuit then we can maintain those changes. Such a feed back in this case is through the tube elements. Therefore any disturbance in the grid circuit can be made to recur if the electrical characteristics of the tube and circuits are correct.

Fortunately, it is easy to start such oscillations. The instability of the applied voltages, or initial surge, on closing the switch is enough. We now have a method of producing high frequency power and it is only a question of adding suitable stages, or larger elements, to the generator to get the desired power output. We next have the problem of finding some way of taking the power out of the plate circuit. This can be done by adding an inductance or by direct connection to the plate tank inductance and then through suitable transmission facilities take the power to the condenser electrodes at the work area. Figure 5 shows two of the electrical circuits which can be used for this purpose.

The work area is that space between the two condenser plates. If we were concerned with induction heating, these plates would be replaced with an inductance. When an insulator is placed between the plates of a condenser to which is applied an alternating source of electric power, the material absorbs the power and heats up. Of the various explanations of the mechanism of this heating process, the most reasonable is that it is due to the molecular frictional losses of the material which occur when the molecular structure is alternately stressed by the impressed charges on the condenser plates. This effect is instantaneous and generally uniform throughout the mass of the material. In the use of a condenser to heat materials in this fashion, we are fortunate if the material has those electrical characteristics which permit it to absorb this power in large amounts. This is a different objective than that of the power engineer who wants a condenser to have the least loss possible.

There are one or two electrical quantities of materials to which the chemist is going to have to pay more attention if he is to use dielectric heating. They are: Power Factor; Dielectric Constant; Loss Factor; Frequency; Voltage Gradient; Power Density and Dielectric Strength.

In Figure 6 we have what the electrical engineers

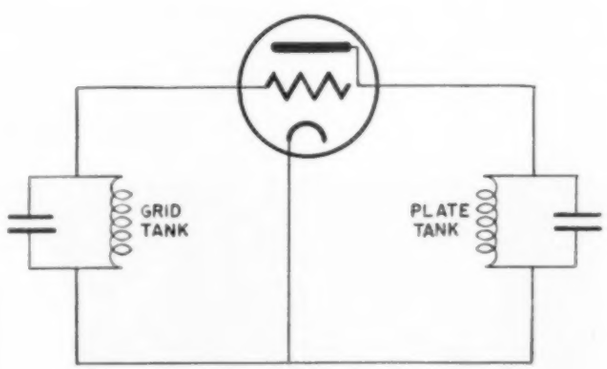


FIG. 4—Tuned grid-tuned plate oscillator.

call a vector diagram. It is a graphical method used to show the relative angular displacement of current and voltage in alternating current circuits. In such circuits a displacement takes place between the voltage and the current if condensers or inductances are present in the circuit. In contrast with this we find in direct current circuits that the voltage and current are in step or phase.

In a perfect condenser the current leads the voltage by 90° as shown in the vector diagram of Figure 6 by OV_1 and OI. If this were true of the dielectrics we expect to use in this form of heating we would have a perfect condenser with no power absorption. Actually the voltage takes some position such as OV making an angle θ with the current vector OI.

The power absorbed by the condenser is given by the equation

$$P_a = VIC_{os}\,\theta \qquad \text{Eq. 1}$$

The apparent power

$$P = VI$$

$$\text{The ratio } \frac{\text{Power absorbed}}{\text{Apparent Power}} = \frac{P_a}{P} = \frac{VI\,C_{os}\theta}{VI} =$$

Power Factor $= C_{os}\,\theta$.

Sin $\alpha = C_{os}\,\theta$.

When α is small and in Radians Sin $\alpha = \alpha$.

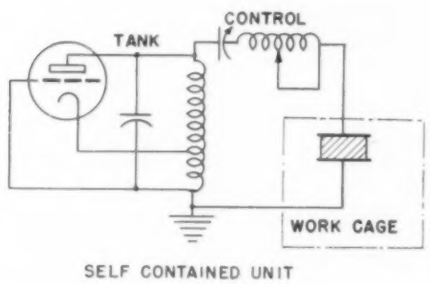
The power factor of the condenser with the material is α.

Referring to Equation 1

$$P_a = VI\ C_{os}\,\theta$$

and substituting for $C_{os}\,\theta$ we have

$$P_a = VI\,\alpha, \qquad \text{Eq. 2}$$



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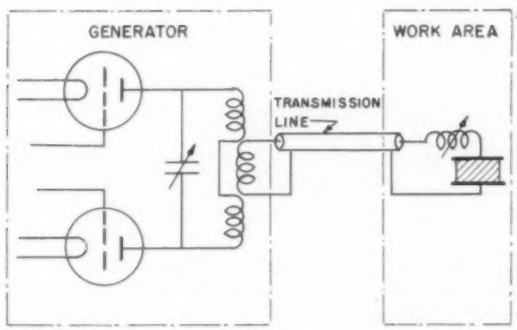

REMOTE WORK AREA UNIT

FIG. 5.

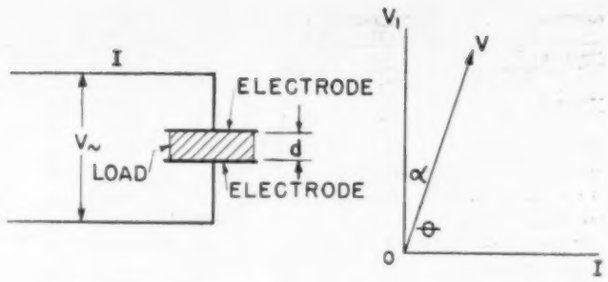

FIG. 6—Vector diagram of a condenser.

where V is the Voltage across the plates of the condenser,
I is the current in the circuit,
α is the power factor (generally given as a percentage).

The capacity of a condenser is determined by the dimensions of the space between the electrodes and the kind of material in that space. We use the term Dielectric Constant K as an indicator of the effect of different materials on the capacity of a condenser. Briefly, the Dielectric Constant K is the ratio of the capacitance of the condenser with the material in place compared to the value of the capacitance if the space between the electrodes were a vacuum.

The factors effecting power density in the material of the condenser can be developed as follows from Equation 2:

$$P_a = VI\,\alpha.$$

The current can be calculated from the equation

$$I = 2\pi f\ V\ C, \qquad \text{Eq. 3}$$

where f = frequency of applied power,
C = capacity of the condenser,
V = applied voltage.

The capacity of a parallel condenser is given by

$$C = m\ K\ \frac{A}{d}, \qquad \text{Eq. 4}$$

where m = a constant depending on the system of units used,
A = the area of one plate,
d = the distance between the plates of the condenser,
K = Dielectric Constant of the material between the plates.

Substituting in Equation 2 the value for I in Equation 3 and the value for C given in Equation 4, we get

$$P_a = 2\pi f\ V^2\ m\ A/d\ K\ \alpha.$$

Rearranging and dividing each side by Ad we have

$$\frac{P_a}{Ad} = 2\pi f \left(\frac{V}{d}\right)^2 m\ K\ \alpha,$$

but Ad is the volume of the space between the electrodes and therefore

$$\frac{P_a}{Ad} = \text{Power density} = 2\pi f \left(\frac{V}{d}\right)^2 m\ K\ \alpha. \qquad \text{Eq. 5}$$

In equation 5 it can be seen that the power density is proportional to the frequency, dielectric constant, power factor and the square of the voltage gradient.

The product K α is called the loss factor of the material. We will designate this by e_b.

MATERIAL	FREQUENCY MC/SEC.	DIELECTRIC CONSTANT	POWER FACTOR %	LOSS FACTOR	SOURCE OF DATA
TREAD & 2 PLIES RAYON	15.0 20.0 40.0	6.23 6.13 5.99	5.7 4.5 3.5	0.36 0.28 0.21	(b) (b) (b)
TREAD & 3 PLIES RAYON	15.0 20.0 40.0	4.62 4.59 4.52	5.8 6.0 4.4	0.27 0.28 0.20	(b) (b) (b)
HARD WHEEL PREPS	13.6	4.20	1.9	0.079	(a)
TRANSITE	20.0	5.86	5.4	0.31	(b)
ACS—FORMULA RUBBER	20.0	3.10	0.5	0.0155	(b)
RAW GELLED FOAMEX	2.0	62.00	99.9	61.94	(b)
CURED WET FOAMEX	2.0	9.00	98.4	8.86	(b)
DURALON RESIN PLUS GLASS FABRIC	13.5 27.0	1.88 1.88	0.845 0.818	0.016 0.015	(b)
CRUDE RUBBER	15.0	2.30	0.42	0.010	(b)
BAKED CORE SAND	50.0	8.92	0.27	0.0242	(b)
UNBAKED CORE SAND	50.0	7.44	0.55	0.0417	(b)
PHENOL-FORMALDEHYDE NO FILLER	1.0	4.5—5.0	2.5—6.0	0.113—0.30	(a)
PHENOL-FORMALDEHYDE GLASS FABRIC	1.0	3.7—4.5	1.0—2.0	0.04—0.09	(a)
MELAMINE-FORMALDEHYDE ASBESTOS FILLER	1.0	6.7	4.1	0.275	(a)
SELECTRON 5003 GLASS FABRIC	13.5	4.1	1.9	0.049	(b)
PLASKON 911 GLASS FABRIC	13.5	4.45	2.0	0.089	(b)
HERESITE L-100 AFTER 3 HRS. AT 350°F	13.5 27.0	4.11 3.93	0.85 0.93	0.035 0.036	(b)

(a) PLASTICS CATALOGUE 1944

(b) FIRESTONE LABORATORIES

FIG. 7—Some typical constants.

When we express Equation 5 in terms used by the electronic engineer, we have

$$\text{Power Density} = 1.41 \; f \; V_a^2 \; e_b \text{ watts per cubic inch} \qquad \text{Eq. 6}$$

where, f = frequency in Mc/sec.,
V_a = voltage gradient in KV/in.,
e_b = loss factor.

The values of power factor and dielectric constant can be obtained through the use of a radio frequency bridge. Their product is the loss factor in Equation 6.

Dielectric strength is important because it is a measure of the ability of the material to resist breakdown due to high voltage stresses. This factor is generally given as the rupture, or breakdown, voltage per unit thickness.

We now have some of the basic theory which, while it takes time to digest, is important. A knowledge of it will give the chemist a picture of what this thing called dielectric heating is and what factors in the material are important in addition to the formulation.

Some typical constants are given in Figure 7 in which it will be seen that the loss factor is influenced to some extent by the *frequency of the applied power*. The loss factor will also change with the temperature of the material during process.

FIG. 9—G. E. 5 KW plastics preheater.

Applications in General Fields

Dielectric heating has been applied to many industries, some related to the rubber industry and others which are not. While we are concerned at this time with rubber and plastic applications it may be of interest to touch briefly on one or two other fields.

In the food industry, for instance, the use of high frequency is contemplated for cooking short orders such as weiners and meat sandwiches. But a word of caution here if anyone is thinking of cooking the Sunday roast—make sure there is no fat or bones in it. The loss factors are not the same as the rest of the meat. Also give a thought to the cost of the oven which requires a high frequency generator.

The use of high frequency in the conditioning of tobacco is a relatively old application. It has been used in the low temperature evaporation of liquids (Figure 8, not shown). Drying of resin-impregnated core sand for the foundry is a rather new but promising application *(3)*. Setting of twist in rayon cord fabric has been accomplished with use of this power *(4)*. The drying of plaster molds is another application. The drying of wood and gluing of laminations is an established practice. For those in this field there are many articles in the literature on this subject *(5, 6, 7)*.

The application of high frequency as a preheat source to thermosetting molding materials by the plastics industry has increased tremendously since 1943 *(8-11)*. There are many advantages such as reduced time of cure, improved quality, lower stresses on the press, reduced mold wear, and less time to close the press. In some cases general purpose plastics can be substituted for more expensive materials. R.F. preheating of rag reinforced plastics for use in complex molds decreases the molder's trouble and in some cases makes the difference between being able or not to use this type material in the product.

Preheat times are on the order of 30 to 90 seconds, and the reduction in press cycle about two-thirds that of the conventional press method. It will be well to use screen type electrodes in the preheater to permit easy escape of the vapors from the preforms. Generators for this type of application have an output power of about 2 KW which will take care of preforms of about one pound per charge. Figure 9 shows a unit for this purpose. The frequencies in general use are between 10 and 60 Mc/sec.

A wartime example of the use of electronic preheating in plastics was that in molding B.A.R. gun butts. A factory report from the Fall River Plant of the Firestone Company was as follows:

B. A. R. Gun Butt

(A) Material BM-16966—High Impact, Rag Filled. Preform 4" Dia. x 1½" (*3*); weight—710 grams.

(B) 1—Molding Data (without R. F. Generator)
Mold Temperature—350° F.
Molding Pressure—375 tons.
Curing Time—5½ minutes.
2—Molding Data (with R. F. Generator as preheater)
Mold Temperature—370° F.
Molding Pressure—250 tons.
Curing Time—2½ minutes.

(C) 1—Casting showed a remarkable improvement, both in appearance and strength. The welding at the flow lines which had been rather poor upon occasion was so good as to be almost unnoticeable.
2—Reduced curing time by 54½%.
3—Reduced pressure by 33 1/3%.
4—The finishing department was affected slightly by the increased toughness of the flash at the parting line. This reduction in cure-time and pressure resulted in an enormous saving in man minutes per casting. It also cut maintenance on molds and presses to an absolute minimum.

Plastic film can be sewed or sealed electronically with R.F. power at frequencies of 60 to 200 Mc/sec. *(12)*. The easiest materials to handle are the vinyls. For Velon, frequencies on the order of 200 Mc/sec. appear to be satisfactory.

We find all through these applications certain inherent advantages in dielectric heating when the application is right, but it is very easy to get fooled in this process if we do not analyze each application and check the economics. It is not a cure-all and cannot stay sold on novelty alone. Each process should be checked against at least the following questions:

1. Can the preferred results be obtained otherwise at the same cost?
2. Does it save space or reduce equipment investment?
3. Is quality improved?
4. Can changes in the formulation produce the same result by present methods?
5. Will the labor handling charges due to the increased production eat up the savings in power and time of cure?

If these questions are answered satisfactorily, and the electrical properties of the material are suitable for dielectric heating, then we have some chance of the process working out satisfactorily and we will get the following advantages:

1. Instantaneous heating of the mass.
2. Uniform product throughout the mass.
3. Improvement in quality.
4. Lower ambient temperatures in the work area.
5. Shorter process time.

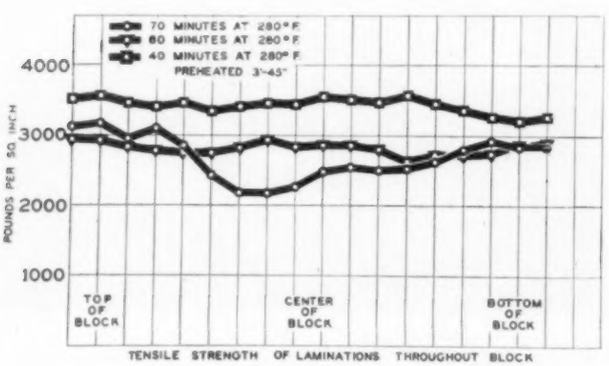

FIG. 10—Effect of curing time on tensile.

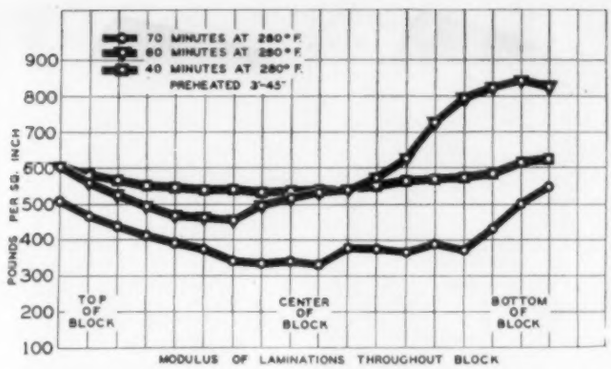

FIG. 11—Effect of curing time on 500% modulus.

Applications in the Rubber Industry

In rubber, as in plastic molded goods, we have applications that produce good results. An interesting series of tests were made by Mr. V. L. Smithers *(13)* to demonstrate the improvement in physical characteristics of rubber stock when preheated by electronics. The stock had the following formula:

Smoked sheets	100
Zinc oxide	6
Sulfur	3
Captax	1
Stearic acid	3

The stock for this test was prepared in the form of laminations of standard tensile test thickness separated by cellophane and stacked to a cured depth of 1.5 inches. After determining that the most suitable cure in a conventional press produced 3000 pounds/sq. in. tensile and 750% elongation at break with cures of between 60 and 70 minutes at 280°F., the test was repeated with an electronic preheat of 3 minutes and 45 seconds to 247°F. and followed by a press cure of 40 minutes at 280°F.

The results in terms of physical characteristics show that there is practically uniform tensile at break with an increase of about 15% compared to the straight press cure, as in Figure 10. Further, that the stress at 500% modulus was very uniform throughout the section, as in Figure 11. The per cent elongation at break was practically constant at 750%, as in Figure 12.

All these values were obtained with reduced cure time. From a power point of view, Mr. Smithers chose a difficult piece of material in this practically pure gum

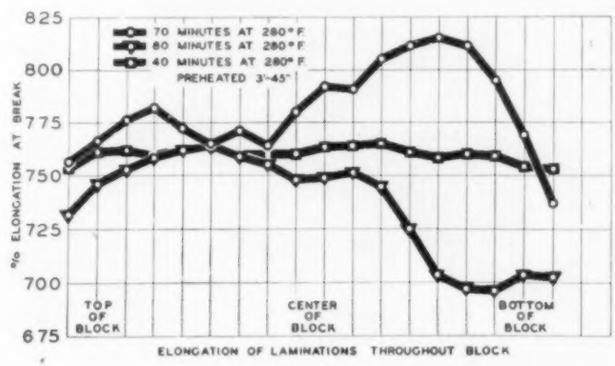

FIG. 12—Effect of curing time on elongation.

FIG. 13—Left: Hard rubber wheel showing effect of accelerated conventional cure. Right: Electronic preheat with short press cure.

stock. Preheat time and press time will be less as the material approaches the compounding used in the molded goods industry today.

The generators used in this type of application are larger. It has been found that 10 to 20 KW at 15 to 35 Mc/sec. frequency are the most flexible for the purpose. A rather interesting sidelight in this case is that since the rubber is evenly heated throughout its mass in the preheating cycle we can often use higher temperatures in the press cure, resulting in a still shorter press time. One or two production examples will illustrate the gain by this method.

Sections of hard rubber wheels are shown in Figure 13. The section on the left, about 2½ inches thick by 6 inches in diameter, was cured in a conventional press with a cure cycle of 120 minutes. This time is obviously too short. The section on the right was first preheated electronically to 230°F. in 2 minutes and then placed in a press for 72 minutes. The improvement in quality is obvious by the decrease in porosity.

In the case of large draft gear rubber parts, as in Figure 14, for which the preparation size was 8 inches by 6 inches by 3 inches, the conventional press cure was not entirely satisfactory at 120 minutes, but with electronic preheat we were able to get a good product. A preheat time of 1½ minutes to a temperature of 190°F. was followed by a press time of 60 minutes. This gave a saving in time and improvement in quality.

In wringer rolls we have reduced the press time by 50% using preheat *(14)*. Figure 15 shows the installation of the equipment for this job, including the electronic preheating equipment and the conveyor system used. Manufactured by the Illinois Tool Works, Chicago, it is a 20 KW unit operating at 22 Mc/sec. and heats 8 rolls at one time. The preheat temperature attained is 185°F. in 1¼ minutes. The press time is 30 minutes compared to 60 minutes in the conventional method. It was found advisable to shape the lower electrode as in Figure 16. This illustration shows the electrode design for wringer roll preheating. The electrodes hold the pieces of stock in place and give uniform heating.

Other applications of R.F. preheating in miscellaneous mechanical goods with a generator of 20 KW size permit us to preheat 30 lbs. of preparation in each charge, heating them to 210°F. in 1¾ minutes.

The production man will appreciate one incidental result of this process. We have found some remarkable changes in curing specifications, since the compounder finds that his concepts of curing time are upset and reacts by raising the temperature of the press cure or changing the formulation. However, in every case such changes also benefit the electronic method and so we still stay ahead. One interesting note in preheating hard rubber wheels was that we obtained better products when we reduced the sulfur content from 40% to 34%. This is probably due to the greater utilization of the sulfur by the electronic method.

We have found in practically every case that we can improve the product by changing the formulation. From experience in production we know that in preheating there is a certain amount of leeway in time for loading presses as the rubber loses its heat rather slowly. Depending on the size this time can be 2 to 4 minutes and with multiple opening presses this is important. Of course since this heat is used in the curing process we cannot delay indefinitely the completion of the loading cycle. This is a responsibility for the production man.

In the field of material drying, it is possible to reduce the time of processing. This is one of the current applications in foamed latex cushions and mattresses.

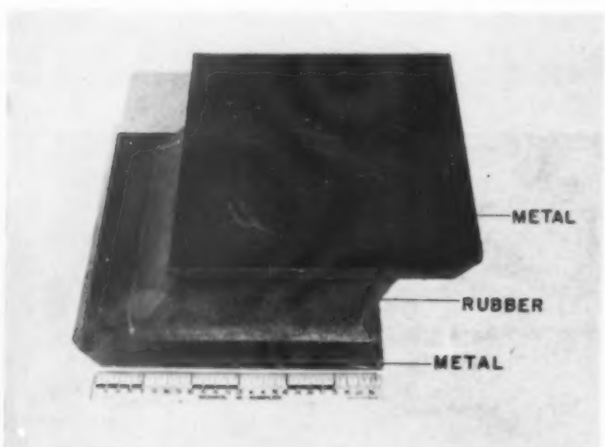

FIG. 14—Draft gear; preform: 8 x 6 x 3 inches; preheated electronically prior to press cycle.

FIG. 15—Electronic preheating and conveyor system for wringer rolls. Equipment by Illinois Tool Works.

In this case we use a 125 KW generator to preheat the material for 1 minute and follow it with a treatment in a drying oven for 1 hour at a lower temperature. Note that here we are dealing with parts up to 4½ inches thick and that the old method took 16 hours. In drying applications of this nature it will be found that this combination of electronic preheat and conventional oven will be the most economical and eliminate trouble from excess cure.

In the rubber industry there are possibilities in preheating fabric before calendering operations. It can be done in the roll form, but is somewhat difficult in sheet, due to the low loss factor, gauge of the material, and the linear speed of the fabric in calendering operations.

An interesting experiment is under way on the Firestone Plantations in Liberia where there is installed a high frequency generator to run some pilot plant tests on drying milled crepe crude. The present method, using drying rooms, takes at least 12 hours. We believe that this can be reduced to 5 hours using a combination of electronic drying for 1 minute followed by conventional air drying at 130°F.

Radio Frequency Curing

The complete cure by electronic methods of rubber compounds is one on which a great deal of effort is being expended. The problems are gradually being solved. It is obvious that with parts that have complex shapes, construction, and compounds, the rubber chemist and the engineer have their problems. Each part is a study in itself to get the right electrodes, control of temperature, type of mold, type of press or holding mechanism for the mold, flexibility of equipment, and ease of handling, but the solution of these has its reward, as in preheating.

Curing of tire repairs has been accomplished in five minutes using generators of 2 KW capacity *(15)*. It has also been disclosed that high frequency can be used in vulcanizing insulated cable. This is done by passing the cable under pressure in a conducting fluid, the fluid forming one of the electrodes *(16)*.

The complete cure of a tire is a difficult proposition, because we have different compounds together with steel beads and fabric. It would seem that some recompounding has to be done if the electrical properties

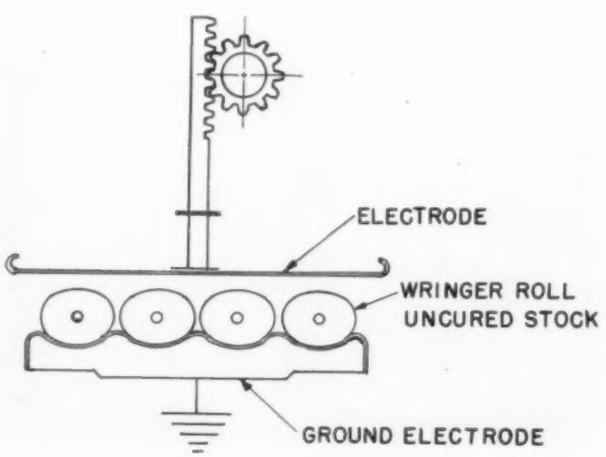

FIG. 16—Electrode design for wringer roll preheating.

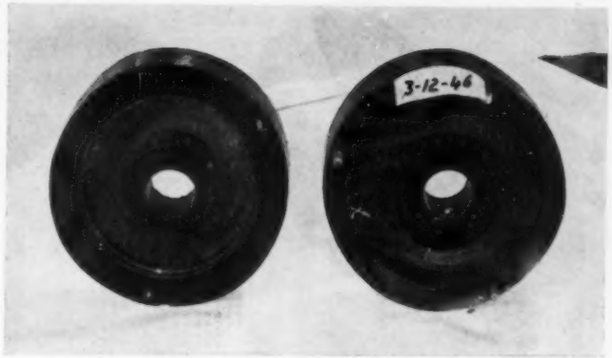

FIG. 17—Tire mold for electronic cure.

of the different stocks are to be equalized. However this is not so big a problem as one would think since the degree of difference is not radical. The real problem is in the mold itself. Perhaps it would help if we listed the things that we feel a tire mold should have. They are: (1) Resistance to mechanical abuse, (2) Suitable dielectric properties, (3) Ease of manufacture, (4) Reasonable cost, (5) Satisfactory strength at the temperatures which it attains, (6) No reaction with the material being molded, (7) Provide sharp detail in tread design, (8) Preferably have low thermal conductivity, (9) Low specific heat, (10) Sufficiently high dielectric strength to resist breakdown, and (11) Have a temperature change during cure same as that of the rubber compound.

If we look over the available materials we are led to consider such products as: Ceramics, Glass, Fibre Glass and Resin, Wood Laminates, Plaster (reinforced), and Transite board.

All of these types of materials have limitations in one respect or another. Those familiar with resins will realize their limitations and their high cost for heat stability at elevated temperatures. To those familiar with the shrinkage of ceramics the problem of accuracy will loom large. Molds have been made of resin and glass fibre and tires cured in them. Development is being pushed in this and other directions. Perhaps the method of applying the power may be changed from condenser electrodes to one in which metal molds may be used. This may take the form of resonant cavities. Obviously tire curing is one of the most difficult applications in the rubber industry. Figure 17 shows a tire mold made of Fiberglas and resin.

The problem of dielectric curing of mechanical goods is somewhat easier. Here we are dealing with smaller items. Perhaps if we combine the preheating process while the mold is open, with the electronic cure, the stresses can be reduced in the mold during the closing and forming operation. Often we make the electrodes so that they reinforce the mold. In wringer rolls some experimental work has been done on the complete cure in a steel mold using the shaft as the hot electrode.

When we come to latex products we have a "natural" in application. Foamed latex has been cured in hot air ovens, steam ovens at atmospheric pressures, and by other conventional means. The molds for this type of cure and the weight per pound of dry rubber is on the order of 30 lbs. of mold per 1 lb. of rubber. In the electronic cure the ratio of weights is 6 to 1. We have used wood molds impregnated with various resins, glass fibre and matt with resins, ceramics and plaster.

FIG. 18—Mold used in electronic cure of automobile foamed latex seat covers.

To date the best results in production have been with glass fibre in cloth or matt form impregnated with resin and formed by low pressure laminate molding techniques. Figures 18, 19 and 20 illustrate such molds.

The pins in the cover are of wood. Their surface, in contact with the latex foam, is coated with a thermosetting varnish. This practically eliminates the use of mold doping. Glass fibre-resin molds have been through many changes in design in this development. The problem of warpage in service was probably the most difficult to correct. It has been found possible to use an aluminum plate for the top of the mold which facilitates the attachment of the pins. It is possible to use wood molds for short production runs. They are economical and require less time for fabrication.

FIG. 19—Construction of Fibreglas-resin electronic mold. (Baker-McMillen Co., Akron).

With the production unit of 125 KW at the Fall River (Mass.) Plant of the Firestone company it has been found possible to cure double mattresses of 40 lbs. dry weight in 5 minutes in comparison to the old cure of 30 minutes. Figure 21 shows the work areas and transmission lines to the ovens. These ovens are loaded alternately and the power switched from one to the other. They are constructed of aluminum. Figure 22 shows the complete installation.

It is possible to cure tube repair material in roll form with electronic power. This can also be a preheating process followed by conventional air oven treatment. In either case the reduction in cure time is very great.

In vulcanizing rubber compounds containing carbon black we get a concentration of the field about the particles. If there is a considerable undispersed mass of this material there will be local hot spots, sufficient to cause electrical breakdown. It is necessary to get good dispersion. No one can object to that. Perhaps use can be made of this phenomena in designing a testing device to check dispersion.

Type of Equipment Required

Equipment can be broadly divided into two classes, the first where the work cage is integral with the generator, as in Figure 23, while the second class is represented by those units which have the work area at some remote point from the generator, as exemplified in Figure 24. The major components of both types of units are:

1. Rectifier section to produce direct current for the plate supply of the tubes.
2. An oscillator section to generate the high frequency power.
3. An output section to transfer the power to the

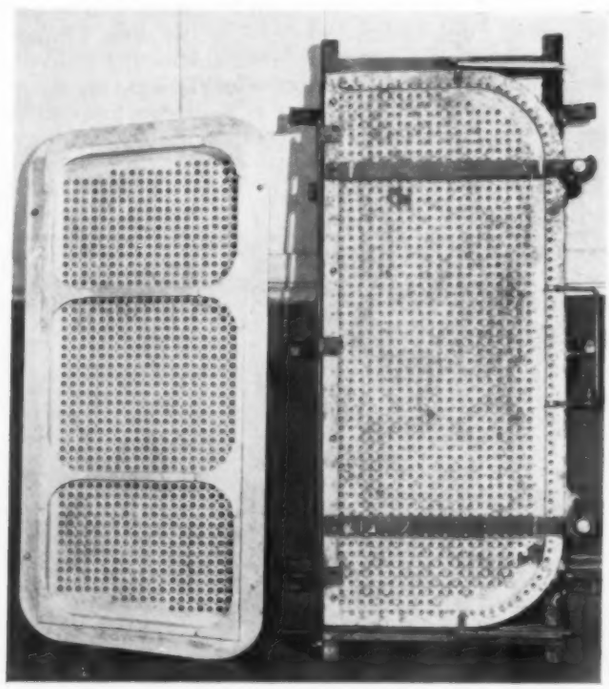

FIG. 20—Foamex molds for electronic cure (left) and for conventional cure (right).

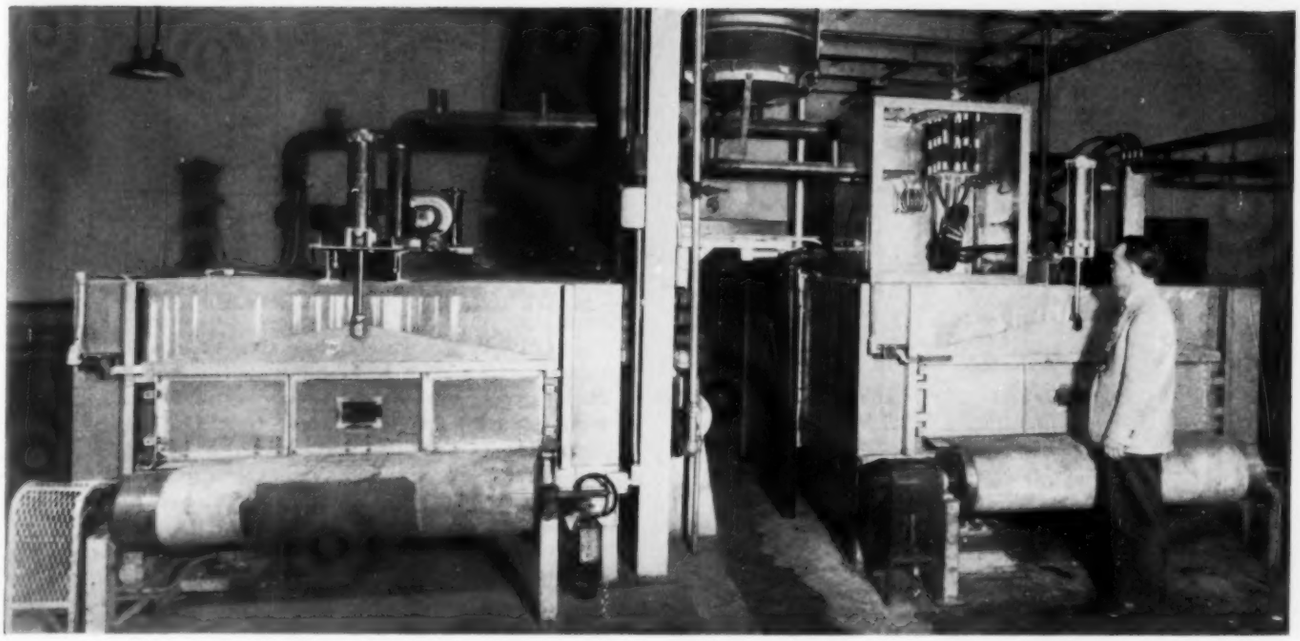

FIG. 21—Work area of the 125 KW electronic unit for curing foamed latex products at Firestone's Fall River (Mass.) Plant.

load with a transmission line, if necessary, for remote work areas.

These fundamental requirements can be modified to meet any special conditions. Frequency control, automatic power level control, automatic matching and automatic timing of the cycle can be added, if the user desires and wishes to pay the price. In ordering equipment it is necessary that the manufacturer be given the following information: (a) Electrical characteristics of the material, (b) The amount to be heated per minute, (c) The temperature rise desired, and (d) The specific heat of the material. If the user will supply these facts, time will be saved and misapplications avoided.

Choice of Frequency

In general, there is no optimum frequency for most applications in the rubber industry except when dictated by size or dielectric breakdown. The size of the electrodes cannot be increased beyond a certain amount dependent upon the electrical characteristics of the material in the load and the frequency of the power. When electrodes are made too large standing waves are produced which cause non-uniform heating. An able discussion of this may be found in a paper by Bierwirth and Hoyler *(17)*.

If we are dealing with thick materials of large size we can use low frequencies, but for electronic sewing of plastic film we need much higher frequencies to eliminate arcing. A frequency of 500 Mc/sec. is used for electronic welding of fine plastic mono-filaments.

One other important factor may definitely limit the choice of frequency. If the user is unable to eliminate harmful radiation by screening he must select one of the frequencies to be assigned for industrial use. In the U.S.A. these frequencies are *(18)*:

13.66 mc/sec.	Tolerance	±0.05%
27.32 mc/sec.	Tolerance	±0.5%
40.98 mc/sec.	Tolerance	±0.05%

For installations operating under these conditions frequency control for the generator is necessary.

Radiation Measurements

Generators of radio-frequency power will emit radiation from any part of the installation unless it is adequately screened. If harmful radiation is suspected, a check should be made *(19)*. Radiation measurements should be made with a load having similar characteristics to the actual load. The measuring equipment should be in good condition and of a type which is acceptable to the Regulating Authority. The field strength is measured in microvolts per meter and a survey of the area surrounding the generator must be made *(20, 21)*.

A map of the area should be obtained and radials indicated on it with their origin at the location of the generator. Measurements of field strength should then

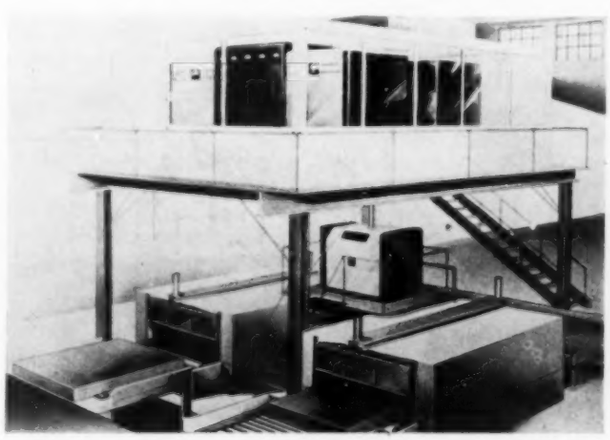

FIG. 22—Artist's conception of the 125 KW unit at Firestone's Fall River (Mass.) Plant.

FIG. 23—Westinghouse 10 KW 27 Mc/sec. unit for preheating. This is typical of units where the work cage is integral with the generator.

be made at points equidistant along each radial, until the strength drops below the ambient noise level. Polar diagrams can then be drawn to indicate radiation pattern at varying distances, and in addition the decrement of the field strength on each radial can be plotted. Since we will find vertical and horizontal components of the radiation and harmonics of the fundamental frequency, it is necessary to measure these at all points where they have significant values.

The maximum permissible field strength will probably be given in microvolts per meter at one mile. No doubt the authorities will issue regulations for the industry designed to limit interference with other services. While we may have permission to radiate on certain frequencies, it is best to check the harmonics which may fall out of these frequencies to see that the field strength is within the maximum allowed.

Screening

Those units which are self contained should, if they are adequately shielded by the manufacturer and used in the correct manner, give little trouble from radiation; however, the user should have some check made. Screening is usually done by surrounding the unit and work area with a grounded metal sheet or screen. In those cases where the work area is remote from the generator, special care is necessary. A pattern of an unshielded and poorly grounded unit is given in Figure 25 for a 10 KW 32 Mc/sec. generator. This pattern indicates field strength at 500 ft. For a unit which is well shielded we get polar diagrams of the field strength at 500 feet, as shown in Figure 26.

Figure 27 shows the change of field strength of fundamental and harmonics along the strongest radial (No. 2). When we consider that this pattern was obtained at a power level output of 60 KW on a frequency of 13.66 Mc/sec. it can be seen that the attainment of reasonable control of radiation is possible but it requires some considerable effort in a large unit. This test was at the Fall River Plant of Firestone on the 125 KW generator previously mentioned in the curing of Foamex cushions.

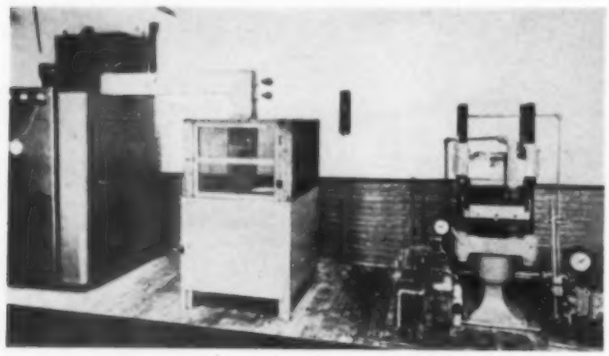

FIG. 24—RCA 15 KW unit with remote loading cage and press.

Material Handling

In preheating, the near location of the generator to the process, and the facility with which it can be moved around, is a convenience to the production operator in both the plastic and rubber industries. The work area can be part of a continuous process in a conveyor system. When we cure Foamex we have light molds and light handling equipment; for seat cushions the mold weight is within the handling capacity of one man. Preheating of stocks can be used to reduce the load on mixing equipment and also permit better dispersion.

Temperature Control

The control of temperature in this process has generally been indirect. It has been either on a time basis with predetermined power input or on some self limiting basis such as the presence of liquid in the material

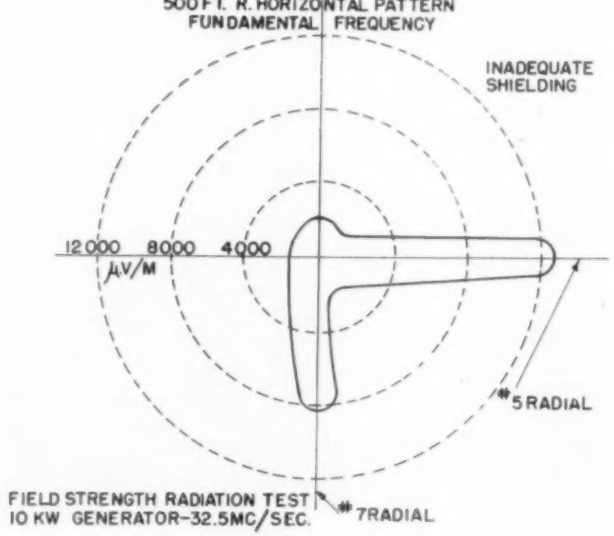

FIG. 25—Pattern of an unshielded unit.

limiting the rise. Other possible methods are the use of thermocouples in the product or in the mold. In these cases we have the problem of error due to the presence of the radio frequency power. Some solutions may be found as in the manner suggested by Bierwirth and Hoyler *(22)*.

Perhaps in place of temperature control, some change in electrical or physical characteristics of the material at the point of completion of the process could be used. The instrument manufacturers have a chance to do something here.

Maintenance of Equipment

The maintenance of the equipment is confined largely to tube replacement, periodic cleaning and inspection of the components. Some thought should be given to the design of more rugged loading cages. Relays should be of adequate capacity and able to stand vibration.

The replacement of tubes can be a determining factor in the cost of operation. It is much better to have tubes which are operating at a power level below their maximum. Tube life is generally guaranteed on the basis of filament life and generally for 1000 hours. It is the writer's opinion that some reference to the hours of use in actual operation should be incorporated in the tube guarantee. For purposes of record, it is advisable to install a time meter in the filament circuit and another in the plate circuit. This will permit an analysis of the use being made of the equipment in terms of tube guarantee. If the operations are infrequent then some form of time delay relay should be incorporated in the unit either to reduce the filament voltage or shut down the unit a few minutes after the last operation. This will prolong tube life.

Testing Instruments Required

The maintenance personnel in plants using small units can be instructed by the manufacturer or perhaps some service arrangment can be worked out with him. If the user decides to do all maintenance work

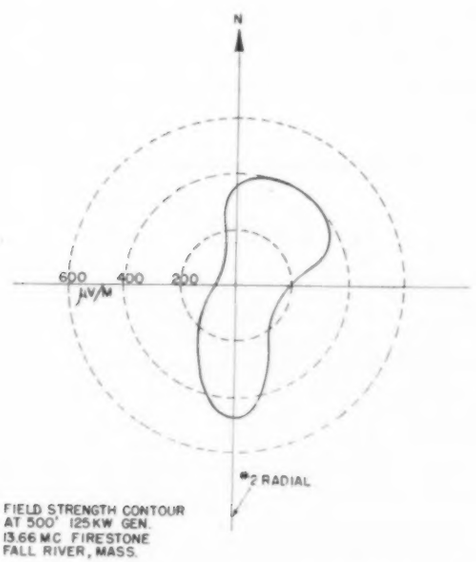

FIG. 26—Pattern of a well-shielded unit.

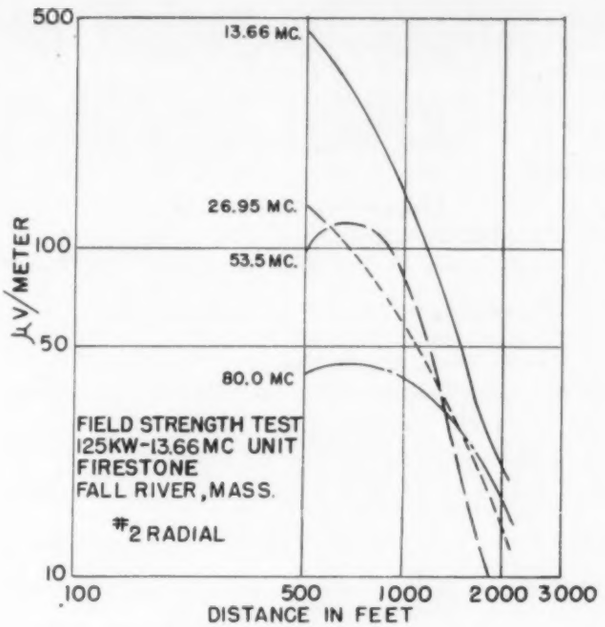

FIG. 27—Change of field strength (along Radial No. 2 of Fig. 26).

then he should have an electronic engineer. This is necessary, in any case, if the units are of large power, since there will be problems of matching the output of the generator to the load for various applications. In all cases the actual production operation of the equipment should be reduced to push button manipulation. It is simple in steam heating and there is no reason why it should not be so in dielectric heating. If the user expects to set up the correct matching facilities it will be necessary for his technician to have certain instruments to permit him to do the job. A suggested list is as follows:

R.F. Voltmeter.

R.F. Bridge for matching problems and power loss determinations.

Signal Generator with enough output at the frequencies considered to supply the bridge circuit.

A Receiver of suitable frequency range.

A Field Strength Meter of approved type is necessary if this work cannot be done by some agency.

Summary

Summarizing a very brief survey of a large field it can be said that where the application is suitable, improvement in quality of the product and reduction in process time is possible. Future developments will be accelerated as users and equipment manufacturers solve the application problems. Higher frequencies will probably be used with wave guides or resonant cavities as work areas as tubes and wartime techniques become available. Much progress has already been made in the application of dielectric heating by industry yet these advances mark only the initial steps in a field of boundless possibilities.

ACKNOWLEDGMENT

The writer wishes to acknowledge the loan of illustrations of units made by the Radio Corporation of America, General Electric, Illinois Tool and Westing-

house Electric companies. The illustration for Figure 19 was furnished by the Baker-McMillen Co., Akron, Ohio. Permission to use illustrations Nos. 10, 11, 12 was kindly given by Mr. Verne L. Smithers. Acknowledgment of assistance in presentation is made to Mr. F. H. Mason, of the Engineering Laboratories, Firestone Tire and Rubber Company, Akron, Ohio.

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Blowing Agent No. 15

BLOWING Agent No. 15, a finely ground mixture of biuret and urea, has been developed and introduced for the preparation of unicellular products, i.e., those products containing a closed cell structure, by the Sherwin-Williams Co., 295 Madison Avenue, New York 17, New York. The new material is white in appearance, has a specific gravity of 1.447, features good storage stability, and is not hazardous to health when used in natural or synthetic rubber in recommended amounts.

The difficulty of using ordinary blowing agents in synthetic rubber stocks lies in the fact that, due to the nature of the synthetics, it is possible to obtain a well blown product with little strength by using a highly plasticized but poorly reinforced stock, or a poorly blown but high strength sponge by using a reinforced stock which is not sufficiently plastic. The use of Blowing Agent No. 15, however, is said to permit the incorporation of moderately reinforcing fillers into partially plasticized stock, thus producing cellular products with good resilience and strength.

When the new blowing agent is used for cellular products it is not necessary to use auxiliary agents, such as fatty acids, since the blowing agent decomposes directly into ammonia without any interaction with other materials. The only fatty acid necessary, i.e., that required for accelerator activation, is usually present in sufficient quantity in the synthetic rubber itself. Although sufficient ammonia will be generated to blow moderately plasticized stocks when curing is carried out at temperatures of 287°F., more regular cell structure is obtained when temperatures between 307°F. and 330°F. are used.

While Blowing Agent No. 15 may be used alone to produce good results, it also lends itself to combination with other blowing agents, such as diazo amino benzene and sodium bicarbonate. The new blowing agent may be used with all types of synthetic rubber, and with blends of natural rubber and synthetic rubber.

Dispersed Zinc Stearate

ZINC stearate dispersed in water with the aid of a wetting agent, which will volatilize at or below the temperature of boiling water, has been developed and introduced by the Beacon Co., 97 Bickford St., Boston, Mass. Called "Aquazinc," the new material can be used to advantage in the manufacture of cements, neoprene adhesives, coated paper, butyl rubber compounds, and with all types of latex. In addition, it is said to offer a convenient method of applying zinc stearate to molded goods, since it can be diluted with water and sprayed on prior to curing.

Because of the water dispersibility of Aquazinc, many new applications can be found for it which the water insolubility of powdered zinc stearate prohibits. Since it is economical and efficient, it can be applied with uniformity, according to its manufacturer, and with no loss. The manufacturer also states that its use eliminates the dust, inconvenience, fire hazard, and other difficulties which accompany the use of powdered zinc stearate.

Correction

Due to a misprint the footnote referring to the correlation of swelling with the dielectric constant of the swelling liquid by Ostwald contained in the article on "Swelling of Rubber. II. A Comparison of the Swelling Behaviour of Vulcanized Natural Rubber and GR-S in Organic Liquids," by F. S. Rostler, K. S. Rostler, R. E. Morrison and R. M. White, in our June, 1946, issue (page 300, first column), was in error. The footnote should have read as follows:

† Ostwald's formula $D\sqrt[n]{S} = \text{Const.}$, where n is a value between 2 and 3, D, the dielectric constant of the liquid, and S, the swelling, has frequently been misquoted as $\sqrt[n]{SD} = \text{Const.}$

Recovery, Distribution and Nature of Rubber from Cryptostegia Grandiflora Leaves

By C. E. LINSCOTT and J. McGAVACK

General Laboratories, U. S. Rubber Co., Passaic, N. J.

A RECENT publication *(1)* shows the distribution of rubber between the leaves and stems of Cryptostegia grandiflora and gives data on the occurrence of the rubber in the leaf cells and latex ducts. Another paper recently published *(2)* describes a method of harvesting the latex rubber bled from the stems. The purpose of this paper is to describe some of the work done toward the recovery of the leaf rubber. Substantial amounts of the total rubber in the plant were often found in the leaves. Some further data are given on the distribution of the rubber in the leaf, between latex and cells. A number of observations are presented on the effect of various treatments on the character of leaf cell and latex rubber.

Recovery of Leaf Rubber

(A) General: The method of recovery, in general, consisted of ball milling leaves with suitable reagents. The concentration of rubber in the leaves used was of the order of 4 to 6%. In order to economize on time and equipment and recover the rubber in a purer state, the leaves were given a pretreatment to concentrate the rubber in them.

The methods of leaf breakdown and concentration of rubber were either chemical, bacterial, or a combination of the two. The chemical method consisted of digesting with hot acid, then hot base, or hot base alone. In either case the leaf rubber was separated by ball milling the digested and washed leaves. It was also found possible to ball mill leaves directly with a cold base. Sodium hydroxide was preferred. Under the best conditions as much as seven-eighths of the original weight was removed and an eightfold concentration of benzene extract resulted. This was obtained from the hot acid and hot base treatments. The leaves used for the chemical treatment were either green or dried before digestion.

TABLE I—RUBBER RELEASED FROM ENSILED CRYPTOSTEGIA GRANDIFLORA LEAVES BY BALL MILLING WITH COLD NaOH

Run No.	24	25	22
Time ball milled (hrs.)	¾	1½	2½
Wt. rubber worms (dry-g.)	19.0	20.1	22.8
Wt. Benz. Ext. in worms	10.3	....	12.7
Wt. Acet. Ext. in worms	4.7	....	4.1
% Recovered of total Benz. Ext. in ensiled mash	59.5	....	73.4

Charge in ball mill: 1400 g. H_2O, 28 g. NaOH, 142 g. leaf solids containing 17.3 g. benzene extract.

TABLE II—EFFECT SIMULTANEOUS VARIATION OF NaOH CONCENTRATION AND TIME OF BALL MILLING ON RUBBER RELEASED FROM CRYPTOSTEGIA GRANDIFLORA LEAVES

Run No.	30	31	32
Wt. NaOH (dry-g.)	28	14	7
Time ball milled (hrs.)	1	1½	2
Wt. rubber worms	20.5	19.8	12.2
Wt. Benz. Ext. in worms	11.4	10.6	5.8
Wt. Acet. Ext. in worms	2.8	4.4	2.5
% Recovered of total Benz. Ext. in ensiled mash	66.0	61.3	33.5

Charge in ball mill: Same as Table I except NaOH varied.

The bacterial method of breaking down the leaf structure and concentrating the rubber consisted simply of covering the leaves with water and allowing them to undergo anaerobic decomposition. The treatment was carried out with a crude culture and was applied to either green or dried leaves. This method is slow but simple, in that it requires only a storage tank and water. It has the advantage of protecting the rubber from air during treatment. Under these circumstances two to threefold increases in benzene extract were obtained. Decomposed material could be further concentrated by chemical treatment as desired. Usually this took the form of ball milling in the presence of caustic soda.

(B) Recovery Method as Practiced: The method used consisted of the bacterial treatment followed by ball milling with caustic soda and was carried out in detail as follows:

Cryptostegia grandiflora leaves, grown at Yuma, Arizona, were stripped off the plants at ages up to five months. They were stored in a large underground cistern, covered with water, and allowed to ensile for a period of several weeks. The temperature was in the neighborhood of 90° F. Analysis of the ensiled and washed leaves showed the benzene extract was increased from 4.7% in the dried control leaves to 12.2% in the processed leaves. Portions of the ensiled leaves were treated with cold caustic soda in the ball mill. A one-gallon ball mill was charged with 750 grams of the leaf mash (19% T.S.) and 6½ pounds of ½ to ¾ inch stones. Enough water was introduced to make the slurry just thick enough for the balls to slide through when well broken down. The sodium hydroxide concentration varied from five-tenths to two per cent on the water, and the time of ball milling from three-quarters to two and one-half hours. (cf. Tables I and 2.) The rubber was released as sticky, contaminated yellow lumps or flocs on the ball mill cover or among the stones. The aqueous slurry was diluted and the worms were collected and washed in a clean ball mill half full of fine pebbles and filled with a solution of potassium oleate (0.25%) and Calgon (.125%). The washing

TABLE III—RUBBER RELEASED FROM CRYPTOSTEGIA GRANDIFLORA LEAVES BY BALL MILLING FOR VARIOUS TIMES AFTER NaOH BOIL

Run No.	21	20	19
Time ball milled (hrs.)	½	1	2
Wt. rubber worms (dry-g.)	11.6	17.2	21.6
Wt. Benz. Ext. in worms	5.5	....	10.7
Wt. Acet. Ext. in worms	2.9	....	5.6
% Recovered of total Benz. Ext. in ensiled mash	31.8	....	61.9

Charge in boiling of ensiled leaves: 3600 g. H_2O, 60 g. NaOH, 142 g. leaf solids containing 17.3 g. benzene extract, boiled 1 hr.

was conducted for a period of one hour. During this time the soft worms were dispersed and became lighter in color. On dilution of the soap solution they coalesced, were removed, and rewashed as above, again diluted and flocculated to a sticky, yellow coagulum which floated readily. This product had a fair rubber snap while wet, but on drying it developed a surface shine, tack, and a tendency to melt and flow off the support.

A few observations were made on the effect of time of ball milling, and concentration and temperature of NaOH on recovery of rubber. When 2% cold NaOH was used in the ball mill, the per cent of the total benzene extract recovered increased with the time of ball milling. (Cf. Table I).

A shorter time in the ball mill with higher concentrations of NaOH released more rubber than a longer time at a lower concentration. (Cf. Table II).

When the leaves were boiled in 1.67% NaOH for one hour and ball milled for varying times, a greater weight of worms was released and a higher benzene extract obtained the longer the ball milling. (Cf. Table III). The total recovery was less satisfactory than when the leaves were ball milled with cold NaOH.

Table IV indicates the difference in the purity of the rubber worms released from the ensiled mass when caustic soda is used as compared to water alone. With caustic soda, yellow floating worms were obtained; with water, black sinking ones resulted. The latter were much lower in benzene extract and contained four to five times as much nitrogen and benzene insolubles. The ash content was also higher.

Even the worms released with the caustic soda treatment were quite impure. For this reason they were ball milled in a potassium oleate and Calgon solution. Under these conditions the benzene insolubles in the worms were reduced to less than 1% after washing for two hours or more. The washed worms consisted of about two-thirds benzene extract and one-third acetone extract.

When the ball mill washing was carried out for two successive one-hour intervals, both the benzene insolubles and the acetone extract were removed, the benzene extract was increased from 56 to 85%, and the washed rubber became less papery and more rubbery.

TABLE IV—COMPOSITION OF RUBBER WORMS RELEASED BY BALL MILLING ENSILED CRYPTOSTEGIA GRANDIFLORA LEAVES

		Per Cent				
	Ball milled with	N	Ash	Acet. Ext.	Benz. Ext.	Benz. insolubles (by diff.)
Ensilage	.....	...	...	18.7	10.7	....
Floating Worms	NaOH	.30	1.86	27.0	61.1	8.16
Sinking Worms	H_2O	1.37	2.70	26.7	24.5	37.54

TABLE V—DISTRIBUTION OF RUBBER BETWEEN DUCT SYSTEM AND LAMINA IN CRYPTOSTEGIA GRANDIFLORA LEAVES

	Lamina	Duct
Wt. leaf fraction (dry g.)	9.98	1.80
Wt. Benz. Ext.	2.16	0.20
Wt. Acet. Ext.	1.12	0.22
% in each leaf fraction of total Benz. Ext.	91.5	8.5
% in each leaf fraction of total Acet. Ext.	83.7	16.3
Nature Benz. Ext.	Sticky	Sticky

Distribution of Rubber in Leaves

In order to obtain some information regarding the distribution of rubber in the leaves between the duct system and the remaining parts of the leaf, a set of mature green leaves from old plants was obtained and preserved by freezing. These leaves were digested with 2 per cent caustic soda for one hour at 30 pounds. The softened leaves were then gently shaken in a mechanical agitator, where both the midrib and main veins separated from the lamina. The former felted together and were readily removed from the latter, which became a dispersed pulp. The two fractions were recovered, washed, dried and analyzed. The results obtained are given in Table V.

Over 90% of the total rubber in the leaf was found in the lamina section. The benzene extracts obtained from both fractions were sticky, low grade rubbers. The concentration of acetone extract was approximately the same in the digested ribs and lamina in this experiment. However, the concentration of benzene extract is approximately twice as high in the lamina as in the rib fraction.

Another set of leaves was separated into the rib-vein and lamina fractions by cutting water soaked leaves close to the ribs and coarser veins. The two fractions were sulfuric acid digested separately, washed and dried, and extracted in acetone followed by benzene. 87.7% of the total benzene extract and 87.3% of the acetone extract appeared in the lamina. In this case the benzene extract of the rib rubber was firm and readily stripped from glass while the extract

TABLE VI—COMPOSITION OF YOUNG AND MATURE CRYPTOSTEGIA GRANDIFLORA LEAVES

Kind of Leaves	% Acet. Ext.	% Benz. Ext.
Mature yellow	6.62	5.81
Mature green	6.37	3.93
Two weeks old	...	1.40

Note: Leaves were digested in 3% H_2SO_4 at 30 lbs. before extraction.

TABLE VII—EFFECT OF HEAT ON RUBBERINESS OF BENZENE EXTRACTS OF CRYPTOSTEGIA GRANDIFLORA LEAF AND CLIPPING RUBBERS

Source of Benzene Extract	Digestion	Time on Steam Bath (hrs.)	Nature Extract Hot	Nature Extract Cooled	Aged Odor
Mature leaves	H_2SO_4	2	Viscous liquid	Fairly rubbery	....
Mature leaves	H_2SO_4	9	Viscous liquid	V. sl. rubbery	Yes
Many leaves and few fine stems.	H_2SO_4	0	.....	Firm & rubbery	....
Many leaves and few fine stems.	H_2SO_4	5	Viscous liquid	Sl. rubbery	Yes
Plugs of rubber picked off stems.	None	5	Firm & rubbery	Firm & rubbery	No
Plugs of rubber removed from stems by ensiling and ball milling short-shoot clipping material.	None	5	Viscous liquid	Sl. rubbery	Yes

TABLE VIII—EFFECTS OF TREATMENT ON QUALITY OF BENZENE EXTRACT FROM ENSILED CRYPTOSTEGIA GRANDIFLORA LEAVES

Digested (100° C.)	Treatment before Hot Extraction	Anti-oxidant	% Benz. Extr.	Nature B.E.	Aged Odor in Extr.
1 hr. in 1% Oxalic Acid.	Washed with cold H_2O and cold acetone.	JZF	10.8	Firmest	None
1 hr. in 1% Oxalic Acid.	Washed with cold H_2O and cold acetone.	Tonox	13.5	Firm	Some
1 hr. in 1% Oxalic Acid.	Washed with cold H_2O and cold acetone.	None	11.8	Soft	Strong
1 hr. in 2% NaOH.	Ball milled.	None	....	Grease	Strong
30' @ 30 lbs. with 3% H_2SO_4.	Washed and air dried.	None	....	Grease	.....

of the lamina rubber was viscous. Apparently, digestion of the whole leaf in caustic soda prior to extraction, as in Table V, damaged the good quality latex rubber from the leaf ducts.

From the above it would appear that the rubber present in these leaves is located mainly in the lamina and only to a small extent in the rib-vein structure. The rubber separated from the latter with suitable precautions is firm and of good quality. This is notably the case when a leaf is cut and latex allowed to flow out of the duct system. On drying this latex, a firm, light-colored, high grade rubber is obtained.

In young leaves, about two weeks old, only a small amount of rubber is recovered as benzene extract (1.40% in one case) and all of it was of a firm, high quality variety. This may indicate that only latex rubber and not cell rubber is synthesized in young leaves. The difference in benzene extract (rubber content) of young and of mature leaves is shown in Table VI.

Characteristics of Cryptostegia Grandiflora Rubbers

(A) Effect of Heat on Rubberiness of Benzene Extracts of Leaf and Clipping Rubbers: The benzene extracts of whole leaf and latex rubbers from the same plant were exposed in flat bottom extraction flasks on the steam bath for varying times as noted in Table VII. The plant material had been digested in hot sulfuric acid, washed, dried and acetone extracted. The observations were made on the extract in the flask while hot and after cooling. (Cf. Table VII).

It is seen that the benzene extract of acid digested mature leaves or of a mixture of young leaves and a few stems became liquid after a few hours on the steam bath. Some of the rubbery snap of the film was restored on cooling but this decreased with continued heating. An odor commonly associated with aged Hevea rubber was observed on the heated samples after cooling.

In contrast with the above, the benzene extract of plugs of latex rubber, removed by hand from the stems, remained firm and rubbery both while hot and after cooling. After five hours on the steam bath no aged rubber odor developed. However, when similar plugs of rubber were separated from the stems of these plants by ensiling and ball milling the whole mass of clipping material, the benzene extract on heating five hours became a viscous liquid and revealed the characteristic aged odor on the cooled film. Thus, it appears that high quality latex rubber becomes more readily damaged by heat through mixture with the ensilage products derived from a mass consisting of leaves and stems. It may be that the lamina rubber while in the leaf is also of good quality but because of its intimate mixture with the complex mass of leaf constituents is severely damaged by the methods of recovery practiced.

(B) Effect of Antioxidants and/or Treatment Before Extraction on Rubberiness of Benzene Extract: As further evidence of possible good quality of the cell rubber in the leaf, recoveries were conducted on a mass of the above ensiled leaves by several different treatments prior to extraction. The benzene extracts were examined for rubbery quality and aged odor. Antioxidants were present during digestion and in two cases in the benzene during extraction. (Cf. Table VIII).

The best quality rubber was obtained in the benzene extract from the leaves which had been digested with reducing acid (oxalic) containing JZF and washed with cold water and dried with cold acetone to minimize exposure to the oxidizing effects of slow drying in the air. In this case JZF was also present in the benzene during extraction. Treatments similarly carried out in the presence of Tonox gave good quality benzene extracts also. Both were better than without antioxidant. The same leaves were digested with hot caustic soda and ball milled, then extracted with hot acetone and hot benzene. No antioxidant was used in this case. The benzene extract obtained had completely lost its rubbery characteristic and had become like a grease. The rubbery character of the benzene extract was similarly destroyed when the ensilage had been digested with sulfuric acid, washed, and dried before extraction. The above would seem to be fur-

TABLE IX—CHANGE IN SOLUBILITY OF RUBBER WITH TIME OF STORAGE IN DRY CRYPTOSTEGIA GRANDIFLORA LEAVES

Date Rec'd.	Date Tested	Hrs. Extracted	% Benz. Extr.
3-15-43	4-16-43	16	4.04
	4-29-43	64	5.30
	8-10-43	146	2.90
3-29-43	4- 8-43	32	4.03
	8-10-43	146	2.82

ther evidence of damage to the leaf rubber by admixture of other leaf constituents, followed by digestion and recovery under oxidizing conditions.

(C) Change in Solubility of Rubber with Time of Storage in Dried Leaves: Two sets of dry leaves were received in March, 1943, and analyzed for benzene extract after acetone extraction both when freshly received and again after four months storage.

The leaves held in the dry condition showed a marked decrease with age in the amount of rubber extracted with benzene even after prolonged treatment. Apparently some change had taken place in the solubility of the rubber during its storage in the dry leaves.

Summary

1. The rubber in Cryptostegia grandiflora leaves was concentrated by chemical digestion or bacterial decomposition methods, or by a combination of the two.
2. The rubber in ensiled leaves was released by ball milling with sodium hydroxide. It was recovered as sticky, contaminated lumps which were purified by washing in soap solution. Well washed leaf rubber ran 85% benzene extract, 14% acetone extract, and 1% benzene insolubles.
3. The washed leaf rubber as prepared in 2 was of fair quality while wet but tended to melt and flow as it dried.
4. 85% to 90% of the leaf rubber was found to be in the lamina. The remainder occurred as latex rubber in the duct system.
5. Duct rubber was of poor quality when recovered from the veins of green leaves by digestion of the whole leaf followed by agitation to separate the veins from the lamina. Duct rubber was of good quality when the two leaf fractions were cut apart and the veins digested separately.
6. Latex rubber was not readily damaged by heat after manual removal from the plant, but was greatly damaged by heat after removal from the plant by ensiling and ball milling a mixture of leaves and stems.
7. Lamina rubber recovered under conditions tending to keep oxidation at a minimum was rubbery in nature; without such precautions the rubber became a grease.
8. Leaf rubber decreased in benzene solubility as dried leaves were kept on the shelf.

ACKNOWLEDGMENT

The authors wish to acknowledge gratefully the contributions of C. E. Rhines, P. J. Faulks, and J. W. Haefele of the General Development Department toward the accomplishment of this work.

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Crystallization of Unvulcanized Rubber

NATURAL rubber is commonly classed as an amorphous substance and regarded as distinctly different from those classed as crystalline. However, under the proper conditions—usually involving cooling or stretching, or both—rubber exhibits all the phenomena to be expected in the formation and melting of a polycrystalline material. Crystallization and fusion are made manifest by changes in specific volume, specific heat, light absorption, birefringence, X-ray diffraction, and mechanical properties. Studies of crystallization in rubber, using a number of these technics, have been made at the Bureau.

In the May issue of the *Journal of Applied Physics* and in the *Journal of Research* for June (RP1718), Lawrence A. Wood and Norman Bekkedahl give the results of a series of quantitative studies of the crystallization of unvulcanized rubber as a function of temperature. Conditions that might influence the results were purposely kept as simple as possible. The main features of the crystallization of vulcanized rubber have already been shown to be similar to those of unvulcanized rubber, the vulcanization merely causing a decrease in the rate.

Stretching obviously adds complications to the experimental conditions, and so was not employed. Change of volume, as measured in a mercury-filled glass dilatometer, was chosen as the simplest method of measuring crystallization, and the one most likely to yield quantitative data about the course of crystallization or fusion.

Crystallization was observed to occur at temperatures between —50° and +15°C., and to be most rapid at about —25°C. The final decrease of volume on crystallization was usually found to lie between 2.0 and 2.7 percent.

The melting of crystalline rubber was found to occur over a range of temperatures, and to be closely related to the temperature at which the crystals were formed. The temperature at which the beginning of melting occurs is from 4 to 7 degrees above the temperature of crystallization. The range of melting is about 35 degrees at the lowest temperatures and decreases to about 10 degrees at the highest. The same range of temperature of melting is obtained, regardless of the extent of the crystallization.

The nature of the crystalline regions in long-chain high polymers has been the subject of considerable discussion in recent years. It seems generally agreed that the structural units of the crystallites are not whole molecules, but rather kinetic units that are segments of chains. Consequently, a single chain may contain segments that are units in two or more different crystallites, joined by segments that are to be regarded as part of the amorphous material. However, no detailed picture has been proposed that logically and satisfactorily explains the fact that the range of melting is not dependent on the extent of crystallization and that it is definitely determined by the temperature at which crystallization occurs.

Developments in the Field of Testing Procedures for the Evaluation of Natural and Synthetic Rubbers and Plastic Elastomers

Sponsored by Bureau of Ships, Navy Department

Part III

By THEODORE A. WERKENTHIN

Principal Materials Engineer, Bureau of Ships, Navy Department, Washington, D. C.

THERMAL TESTS AT ELEVATED TEMPERATURES

Simulated Continuous Process Cure in Laboratory: The Rubber Laboratory, Navy Yard, Mare Island, developed an ingenious method for simulated wire cure. In the evaluation of various types of rubber and synthetic rubber compounds, it became necessary to evaluate large numbers of compounds. In order to do this expeditiously, a procedure was required which would determine the ability of these wire insulation stocks to cure in the length of time available in continuous processes. In actual manufacturing practice the curing operation of wire covers is exceedingly rapid, and, therefore, an entirely different equipment from the conventional platen presses had to be employed. The apparatus used in this test is illustrated in Fig. 35. For the purpose of evaluation, the experimental stocks were extruded on 3-foot sections of 1/16" steel wire. A fairly uniform layer of approximately 0.05 inch was obtained. The sample of wire was clamped to a plug fitting into the tee connection on top of the fast cure unit. The use of superheated steam admitted to the chamber for the correct interval, regulated the cure to correspond with commercial practice.

Hot Crushing Test of Wire Cover Stocks: One of the properties of insulated wire which is of importance is adhesion to the wire and resistance to crushing. The Rubber Laboratory, Mare Island, developed a test illustrated in Figs. 36 and 37. The apparatus consists of two anvils between which the wire is crushed. These anvils are one inch wide and two inches long. The top half of the apparatus contains an anvil identical with this one. The anvil assembly is surrounded by a chamber which can be heated to the desired temperature, usually 200°F. The wire is laid on the lower half of the anvil. The top half of the anvil is placed on the lower half and after proper temperature conditioning the two halves of the anvil are brought together, crushing the wire insulation between them when the cross-head and platform of a Baldwin Southwark Universal Tester are brought together. The upper and lower half of the anvils are closed at the rate of one inch per minute. The relative resistance of crushing at room temperature com-

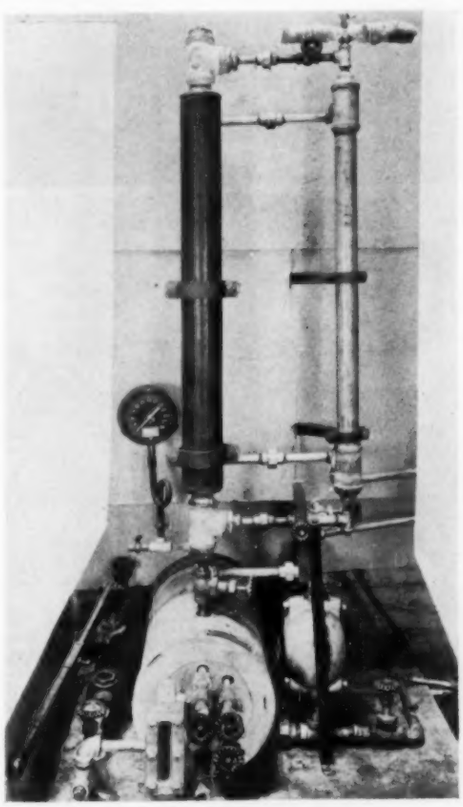

FIG. 35—Simulated continuous process cure for wire insulation.

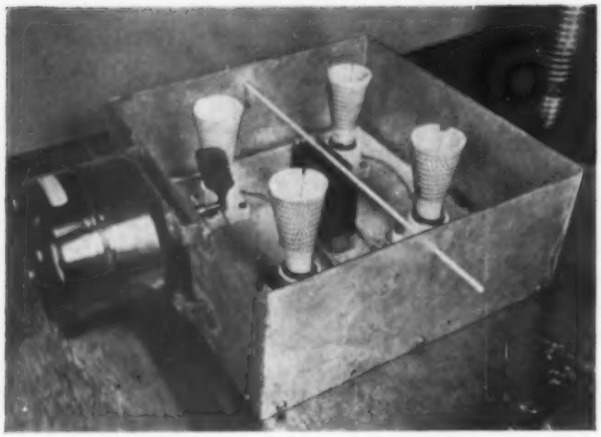

FIG. 36—Apparatus for crushing test on wire insulation stocks.

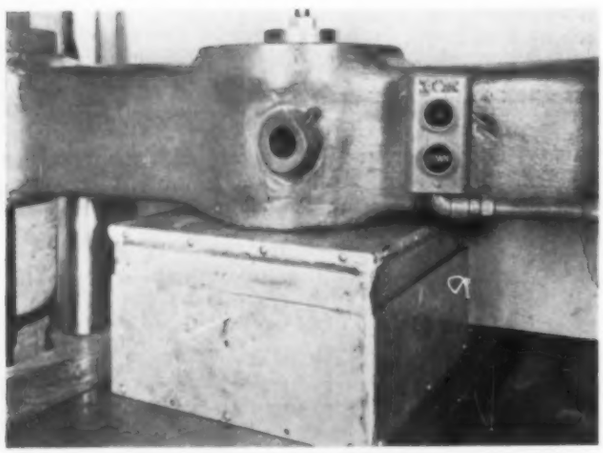

FIG. 37—Wire crushing test assembly closed.

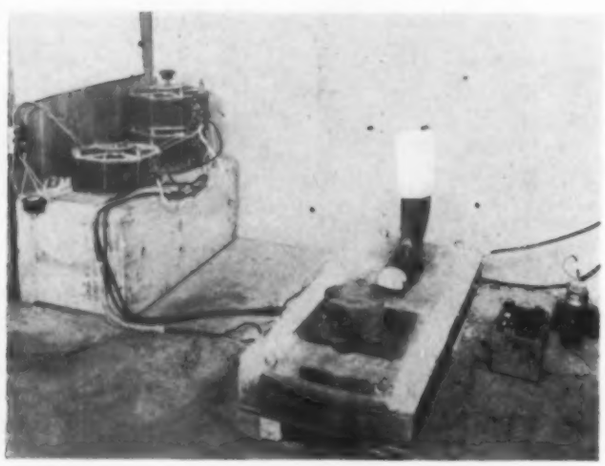

FIG. 38—Apparatus used in special test to determine relative resistance to contact with hot surfaces.

pared to that at 200°F. is the criterion used. The average resistance to crushing at normal temperature for suitable stocks under the conditions of the experiment is approximately 800 lbs. The crushing resistance of the wire when heating to 200°F. drops off to not less than approximately 500 lbs. This test and the cure evaluation are rapid tests which are especially useful in the preliminary evaluation of large numbers of experimental wire cover compounds.

Special Test to Determine Relative Resistance to Contact With Hot Surfaces: The new procedures of modern warfare necessitate the development of rescue and fire fighting equipment which is exceptionally resistant to heat, at the same time being resistant to solvents, gasoline, salt water, and maintaining good slip resistance. In order to evaluate different types of rubber and synthetic rubber heel and sole compounds, Dr. P. King and Mr. R. Taylor, of the Naval Research Laboratory, developed test equipment which would evaluate the resistance to heat ranging from 400°F. to 1100°F. The equipment used in these tests is shown in Fig. 38. The test consists of placing the boot sole under a given weight on a hot steel plate whose temperature is accurately controlled over a range from 400°F. to 1100°F. Differences in the extent of sliding, type of disintegration, and the temperature at which rapid deterioration takes place, are recorded. The force required to move a sole under different temperature conditions when weighed down with 50 lbs. is also recorded. The heated platform was sufficiently rugged so that personnel wearing boots to be tested could actually walk on the heated surface and thus give a service test in addition to the preliminary physical tests. An interesting feature of this investigation was that synthetic rubber material had been developed which is resistant to temperatures far in excess of those which

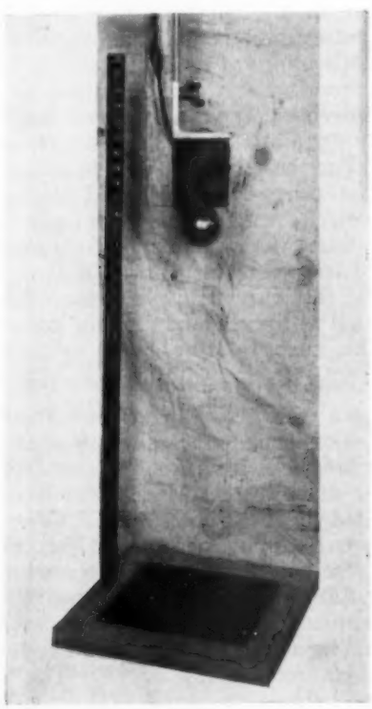

FIG. 39—Apparatus for ball impact test for laminated rubber storage battery cases.

can be withstood by personnel wearing the boots. In other words, the equipment is superior to the human endurance.

RHEOLOGICAL TYPE TEST PROCEDURES

The application of the term "rheological" to describe the various flow properties of natural and synthetic rubbers is, so far as can be determined, original with the author. However, this term has, for many years, been in use to describe the various flow properties of thermoplastic materials, such as asphalt. It is a convenient term to use in connection with all those properties in which a slow displacement of shape and dimension takes place due either to variations in temperature or to the application of pressure, either directly or indirectly, as well as the combined action of both. Natural rubber has been particularly free from cold flow or permanent deformation within the region of temperature in which it was generally employed, namely, from —40°F. to +150°F. However, some of the synthetic rubber formulations are unfortunately not so resistant to deformation either at low or high temperatures and, therefore, a thorough study of all of the rheological properties had to be undertaken.

Compression-Deflection Test: One of the tests which was developed specifically for laminated rubber storage battery cases was a compression-deflection test and ball impact test. In this test, the sample is subjected to compression or loading so that considerable deflection of the laminated section takes place. The purpose of the test is twofold, first to determine what percent deformation the laminated material may withstand, and second to determine to what extent recovery takes place after a deformation somewhat short of the maximum has been imposed on the sheet for a considerable period of time. In addition to the slow application of force and consequent deformation, the laminated case is also subjected to ball impact in which deformation occurs, but this deformation is almost instantaneous. The equipment required for these tests is shown in Figs. 39, 40 and 41.

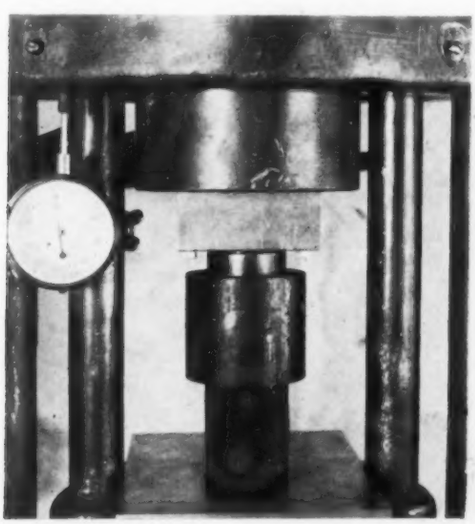

FIG. 40—Apparatus for compression deflection test for laminated rubber storage battery cases.

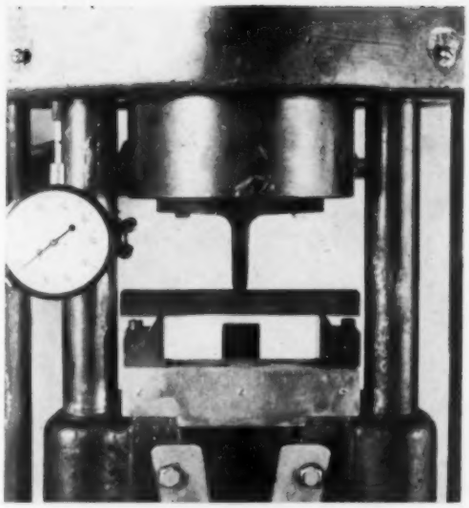

FIG. 41—Specimen in place for transverse deflection test of laminated rubber storage battery cases.

Measurement of Creep: In the development of suitable synthetic rubber materials for torsilastic springs and related uses, and in the evaluation of the various properties of such mechanical rubber devices, a method had to be developed which would measure creep of the synthetic rubber. At first, a double sandwich specimen, utilized by the B. F. Goodrich Company, was employed. This specimen consists of three small rectangular sections of steel between which the rubber sandwich is vulcanized. The load is hung on the central steel rectangular slab and supported on a rail so that the rubber is free to deflect under the load for a period of time. The apparatus used in the test is shown in Fig. 42. The drift or creep over a period of time under certain temperature conditions is meas-

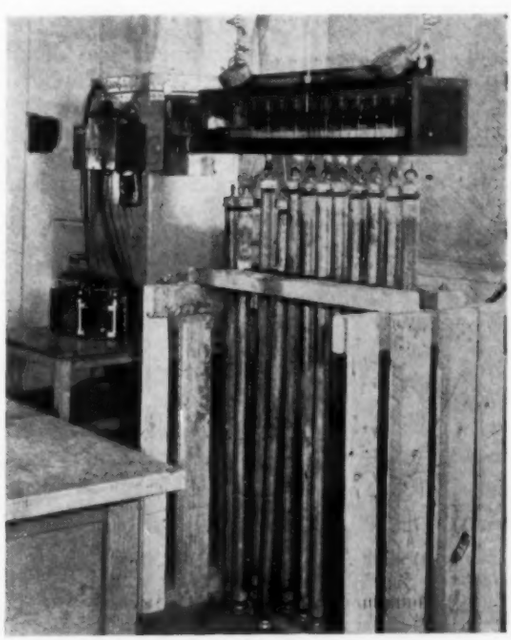

FIG. 42—Apparatus for measuring creep in torsilastic spring compounds.

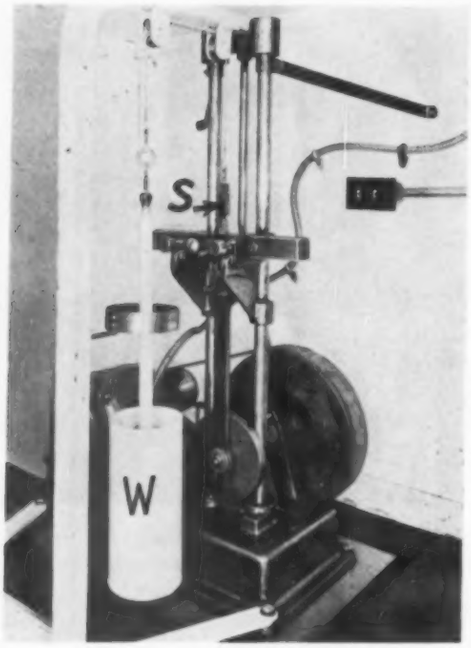

FIG. 43—Apparatus for dynamic creep test.

ured. It was found that this specimen did not simulate the conditions of the actual torsilastic spring, and instead, a creep specimen was developed which is circular, tapering down in the center to a smaller cylinder, similar in principle to that of the dumbbell specimen. In this type of specimen, the adhesion to the metal would exceed the cohesion of the rubber in the small section of the specimen. Indelible marks are made on the rubber and creep is measured by means of a cathetometer. The specimens are placed in a chamber to subject the rubber to any desired temperature conditions, and the loading is either static or dynamic.

Dynamic Creep Test: Another method of determining dynamic creep was developed by the Rubber Laboratory, Navy Yard, Mare Island, utilizing the DeMattia flexing machine. The setup is shown in Fig 43. The specimen used for this dynamic creep test is either the double sandwich specimen described above, or the circular Mare Island dumbbell specimen, likewise mentioned above. The specimen "S" is loaded with the weight "W" and is subjected to additional flexing by the up-and-down movement of the bar of the DeMattia machine. In the apparatus shown, the bar is adjusted for a very slight movement.

Hot Flow Creep Test: A special application of the measurement of drift or flow characteristics was an apparatus designed to measure this property in turbine packings. The gasket is placed in a hollow receptacle and a cover placed on it. The whole assembly is then placed in the compression machine to apply the necessary pressure, as may be seen from Figs. 44 and 45. Superheated steam at the desired temperature is then passed through the hollow chamber to subject the gasket to the actual conditions to which it would be subjected under service. The residual back pressure of the rubber gasket is then measured, together with the extent of permanent set resulting from the combination of pressure and temperature. This type of apparatus was used in the development of suitable compounds for this specific application but has the objection of being suitable for only a limited number of applications.

Resilience Test: In the evaluation of sandblast hose, and particularly in the development of suitable synthetic rubber compounds for this type of hose, various special tests have been utilized. One of these tests was a modification of the Bashore resilience apparatus and, as shown in Figs. 46 and 47, consists of a rod free to move in a glass tube. The specimen of sandblast hose to be tested is mounted firmly so that the inner resilient surface of the hose will be practically horizontal and level. By dropping the rod from a given height on the rubber surface, it is possible to measure the rebound or height to which the rod returns. By varying the height or specific gravity of the material composing the rod, it is possible to vary the weight and consequently the degree of rebound.

Extrusion Test of Thermosetting Masses: With the advent of truly liquid polymers, namely Thiokol LP-2 and LP-3, and their use in hose repair materials,

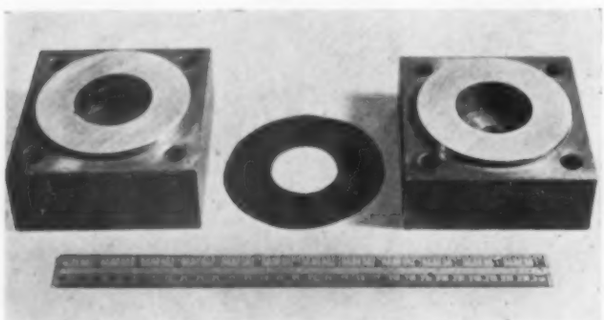

FIG. 44—Test specimen and apparatus for test of turbine gasket.

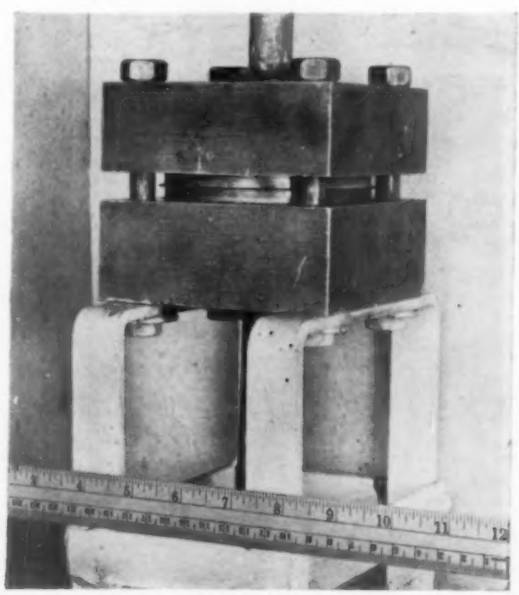

FIG. 45—Specimen in position for turbine gasket test.

wood deck caulking compounds, and cold application coatings for shafts, struts, and rudders, it became necessary to develop a measure of degree of set or vulcanization which takes place in the compound after the addition of the accelerator. For this purpose, the Rubber Laboratory, Navy Yard, Mare Island, developed a pressure extrusion apparatus consisting simply of a small section of brass tubing, two caps, and the necessary air pressure connections. The bottom cap was drilled to make an orifice 0.070" in diameter. This apparatus is shown in Fig. 48. The amount of compound which extrudes in a given time under a pressure of 10 p.s.i. is weighed. In this manner, it is possible to regulate the consistency of the material within certain close limits so that the compound will set up properly in a given time, and at the same time leave sufficient time to the workman to apply the material wherever needed.

Shrinkage Test of Battery Lining: In the covering of large surfaces, such as in providing a rubber covering for the submarine battery compartment, it is essential to measure potential shrinkage of the rubber compound as a consequence of vulcanization and curing. A very simple test to accomplish this was devised by the writer and incorporated in Navy Department Specification 33L4. A steel plate 12" x 12" x ⅛" thick is prepared for application with the unvulcanized coating. Four marks, 1" long and 10" apart, are scribed on the unvulcanized synthetic rubber, each pair of which is at right angles to the other pair of lines and parallel to the edges of the section. After vulcanization, the distance between the marks is again measured in both directions. The results are reported as percentage of shrinkage or expansion. For battery lining this shrinkage or expansion is specified to be not greater than 0.5 per cent.

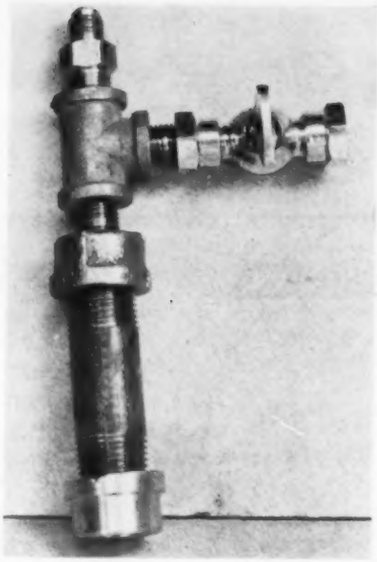

FIG. 48 — Extrusion test for thermosetting masses.

Plastic Flow of Battery Lining: One of the most important functions of battery lining of submarine battery compartments is to protect the storage batteries from vibration and shock, and to protect the steel hull from possible corrosion by sulfuric acid spillage from the batteries. The battery lining must sustain the very considerable weight of the batteries over a period of years. In order to determine plastic flow or drift characteristics of the battery lining, a special test was developed by Mr. C. K. Chatten, of the Material Laboratory, Navy Yard, New York, to measure this property. The test equipment used in this method is shown in Fig. 49. A test sample 4" x 4"

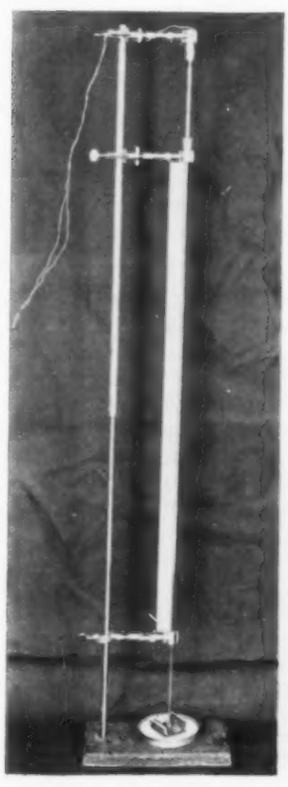

FIG. 46 (Left)—Apparatus for testing the resilience of sandblast hose.

FIG. 47 (Below) — Specimen in position for resilience test of sandblast hose.

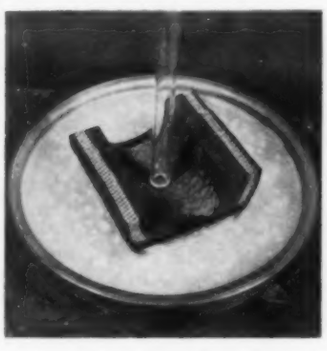

FIG. 49. — Apparatus for measuring plastic flow of battery lining.

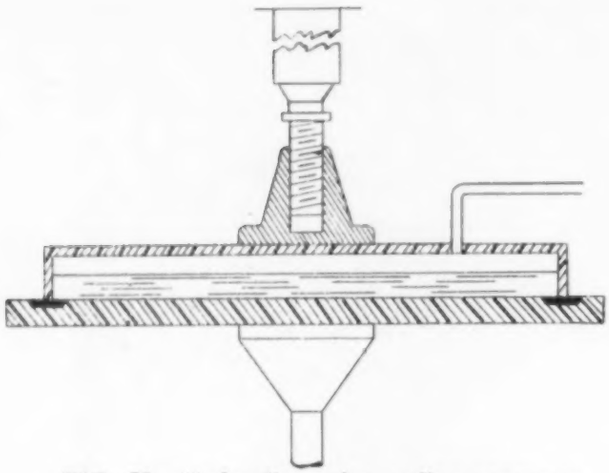

FIG. 50—Hydraulic gasket sealing apparatus.

is cut from a steel panel which has been covered in the same manner as the battery compartment. The sample is placed in the apparatus and a steady load of 100 p.s.i. is applied to the lining over an area of one square inch. The total depth of penetration is measured 30 seconds after application of the load. Additional plastic flow readings are taken at the end of 24 hours and 48 hours, respectively.

This test is usually made at room temperature. However, the same apparatus has been used at elevated or low temperatures to measure the plastic flow characteristics of natural and synthetic rubber under tropical or Arctic conditions. Utilizing this test, it was possible to evaluate synthetic rubbers in terms of natural rubber insofar as behavior under loading of the storage battery is concerned. In developing the tests, the load was applied for periods much longer than 24 and 48 hours. However, it was found that if the slope of the curve was determined by obtaining the original reading and two other readings, it is possible to evaluate the trend of this characteristic for long periods of time.

Wiley Sealing Apparatus: The first seal aging apparatus was described by Wiley, of the Navy Department, Bureau of Construction and Repair.* A diagrammatic sketch of the sealing tester is shown in Fig. 50. This apparatus consisted of a plate having

* Wiley, N. C., "Tests of Rubber Gaskets," Navy Construction and Repair Bulletin No. 2, Dec. 15, 1931.

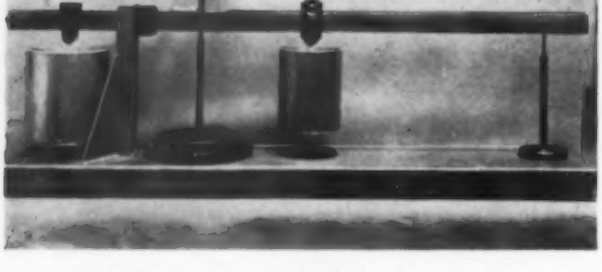

FIG. 51—Beam loaded sealing tester.

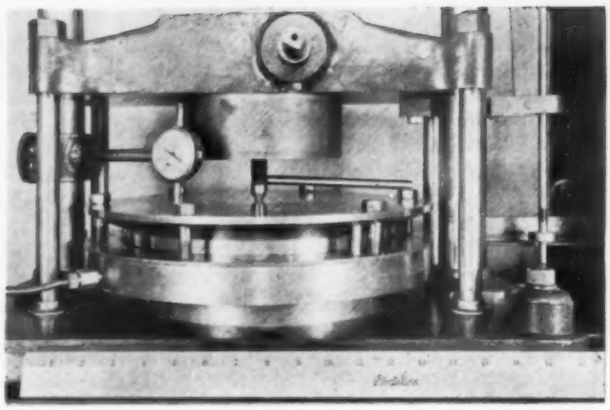

FIG. 52—Mare Island gasket seal aging tester.

a hollowed out section in which the gasket rested on an inverted "knife edge" upper section which is similar in form to a heavy frying pan. The force, required to obtain sealing against a back pressure, was applied by means of a hydraulic jack. It will be noted that while air pressure was used for back pressure, the sealing was against liquid, as a layer of water was put in the compartment and then air pressure was applied.

Mare Island Sealing Apparatus: The Rubber Laboratory, Mare Island, improved this seal tester as shown in Fig. 51. It will be noted that the essential features are retained. However, the force is applied by means of a lever arm weighted down and the back pressure air to the top section is carefully controlled. The extent of the deflection is indicated by a dial type thickness gage. It had the advantage of having a counter balance weight and an arrangement for lengthening or shortening the thimble through which the power is applied to the top platen. In this manner gaskets of different thicknesses can be used for testing. In addition, the weight is placed on a ratchet, facilitating accurate control and easy movement of the weight over the length of the lever bar. An adjustable stop is put under the beam so that once the sealing pressure has been determined the force can be maintained without "follow up." In other words, it is desired to maintain the pressure uniform but not to permit the sealing edge to change its position as a consequence of the gasket taking on a permanent set.

Large Gasket Seal Aging Apparatus: A second improved procedure for testing sealing properties of gaskets was developed by the Rubber Laboratory, Navy Yard, Mare Island, and is shown in Fig. 52. This apparatus uses a 10,000 pound Tinius Olsen Universal Tester for applying the necessary pressure. The desired load is applied to the center of the sealing plate by means of the movable cross-head of the tester, and the bolts are tightened. The connection for internal air pressure is made immediately and the pressure in the enclosure beneath the sealing plate is gradually raised until leakage occurs. One of the objections of the equipment is that it required an expensive apparatus such as the Tinius Olsen tester to produce the desired degree of deflection. The test was fairly satisfactory for approval and for testing in developmental work, but was not suitable for inspection testing.

(To Be Continued)

Patents Available for License

THE list printed below represents United States patents seized by the Office of the Alien Property Custodian from nationals of enemy countries on rubber products (with the exception of tires, rubber thread, and chlorinated rubber). Preliminary investigation indicates that the patents listed are available for license from the Alien Property Custodian. The licenses on vested enemy patents are non-exclusive and royalty free for the remaining life of the patents, the only cost being an administrative fee of $15.00 per patent.

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Vested Patents and Patent Applications Relating to Rubber Products
(Preliminary Open to License)

Patent or Appli. No.	*Class*	*Title*
		Toys
1920317	18-55	Process for the production of rubber toys
1801267	46-87	Inflatable hollow articles composed of flat rubber sheets
1885917	46-87	Inflatable rubber articles
2014426	46-87	Inflatable rubber articles provided with fiber cover and process for their production
2128628	46-87	Toy balloon
2128629	46-87	Toy balloon
2134063	46-87	Rubber toy
1820124	154-2	Rubber ball
1881048	154-42	Inflatable hollow rubber articles and process for its production
1956533	154-42	Method for producing inflatable rubber articles
1926615	273-65	Ball
2073766	273-65	Air valve for use in inflated balls
		Vibration Dampers
2052636	248-4	Elastic fastening appliance for outboard motors
2260978	248-5	Engine support
2017628	248-7	Means for resiliently mounting engines on automobile vehicles
1988951	248-26	Vacuum cleaner
2103154	248-26	Vacuum cleaner
2180613	248-358	Elastic mounting device
2221884	248-358	Elastic bearing
2268306	248-358	Vibration dampening device
2089714	248-363	Holding device
1717855	293-55	Shock absorber, especially for motor vehicles
2035809	293-55	Shock absorbing device for motor vehicles
1998796	296-84	Mounting for glass panels
1882360	296-137	Top for vehicles
		Coating Materials
2108387	260-732	Viscous, waterproof and insulating composition with a basis of rubber to be used hot or cold
2338948	260-735	Solvent for chlorinated rubber
2019207	260-760	Vulcanized rubber solution
2016102	260-768	Production of conversion products of rubber
1987171	260-770	Production of conversion products of caoutchouc
2164140	260-771	Method of converting natural rubber or the like quickly into rubber hydrochloride
1900663	260-770	Manufacture of caoutchouc lacquers or varnishes
1909219	260-773	Process of producing high percent caoutchouc solutions
		Hose and Belts, Cushions
1701507	154-4	Process for manufacturing V-type belts
1878885	154-8	Method of manufacturing rubber hose
2119465	154-8	Method of manufacturing commercial rubber tubes or fabric hose
1713751	154-40	Thin walled rubber articles and method of manufacturing same
1729596	155-179	Process and device for the manufacture of seat air cushions
2116083	165-125	Rubber tube for medical use
1701421	215-79	Rubber nozzle for clinical and like purposes
		Cable-Insulation, Sockets
1870323	154-44	Manufacture of insulating material
1846166	173-322	Elastic suspension for electric lamps and the like
2093663	173-328	Socket for small electric bulbs
1948166	173-358	Holder for incandescent lamps
2054010	174-27	Communication cable
2101386	174-29	Submarine signaling cable
2189091	174-29	Flexible high frequency cable
2175389	174-68	Electrically conducting whale line
RE 21,926	174-106	High tension rubber insulated cable
2096840	174-106	High tension rubber insulated cable
1893266	174-107	Electric cable
1753079	174-108	Submarine cable with pressure protecting covering
APC 412,892	260	Method of producing mixtures of polystyrene with natural or synthetic rubber
		Rubber Cement
2112802	260-743	Rubber compounds and process of making same
2059778	260-746	Mortars or binders containing caoutchouc and process of preparing same

(Continued on page 483)

Editorials . . . . . .

New Price of Rubber

AS REPORTED elsewhere in this issue, the new negotiations between the United States and the principal rubber-producing nations of the world have resulted in agreements under which the United States will pay 23½ cents per pound for rubber in the July-December, 1946, period. This is an increase of 3¼ cents per pound from the 20¼ cents paid during the first six months of the year. It was evident that a price increase was inevitable and since the agreed-upon price was under the 25-cent maximum which the American negotiators had unofficially set it again represents a "victory" for this country. Malayan producers, for example, were urging the British negotiators to seek a price around 35 cents per pound.

For the past three and a half years, natural rubber has been sold to domestic rubber manufacturers at 22½ cents per pound. Now that the United States is paying 23½ cents per pound, f.o.b. foreign port, for this rubber, the question arises as to whether the fixed price to the manufacturers will be increased. Although no official announcement on this score has yet been made, an increase is believed to be pending. It would require continued subsidy to maintain the 22½ cent per pound figure, but sentiment of late has been veering away from the use of subsidies, both in Congressional and industrial circles, so that a higher fixed price may be anticipated. Any move in this direction, however, will probably await the ultimate decision concerning price control regulation.

Collapse of OPA

AT THIS writing it seems quite unlikely that price control will be restored by Congress. Although the legislators are attempting to put through some modified form of control, and the House seems quite sincere in its attempts to put together legislation with sufficient teeth to hold down prices, the Senate is insisting on numerous exemptions, including meat and poultry, which probably means that even if approved within the next week or so such legislation faces a second presidential veto. Some three weeks have gone by since the function of the Office of Price Administration was permitted to lapse, and prices in most lines have advanced substantially. The "black market" is being succeeded by the "white market."

A brief survey of the over-all rubber industry indicates that thus far rubber manufacturers have not taken advantage of the present situation and prices on practically all types of rubber products are being held in line with their recent OPA ceilings. Top executives of leading tire companies have already indicated that unless manufacturing costs rise substantially, tire prices will not be increased over present levels. The tire industry obtained a 3.3% increase in passenger car tire prices shortly before OPA passed out of existence. While this was the first price increase since early in the war, the tire manufacturers are looking ahead to a buyer's market. With the energetic producing capacity of the industry as a whole, this sentiment should govern prices of all rubber products.

Collapse of the OPA does not mean the complete removal of all price rules and regulations. According to an executive order signed by President Truman on June 30, manufacturers, wholesalers and retailers, and all other persons required under price control regulations to have kept records, must preserve such records until July 1, 1947. The order authorized OPA to continue all the functions, powers and duties vested in it by the Emergency Price Control Act of 1942, as amended, and the Stabilization Act of 1942, as amended, which did not terminate by expiration of those acts on June 30, 1946. These records may be utilized by OPA in any suit, action or prosecution with respect to offenses committed or rights or liabilities incurred on or before the official expiration of the agency's price control regulations.

Foundation Lecture

FOLLOWING the tradition of eminent societies, the Council of the Institution of the Rubber Industry (England) has established the Annual Foundation Lecture. The primary object of this lecture is to provide a regular opportunity for members and friends of the institution to hear prominent experts who have established a reputation in their particular field. It is the hope of the I.R.I. that guests from other countries will come to hear the lecture and that occasionally foreign authorities will deliver it. This is definitely a step in the right direction to maintain international contacts which worked out so well during the wartime period. It is to be hoped that the I.R.I. will carry out its intentions in this regard to the full and that technical organizations in other countries will give some thought to establishing similar lectures.

CURRENT NEWS OF THE MONTH

MORE NATURAL RUBBER IS MADE AVAILABLE TO EASE SITUATION OF GR-S CONSUMPTION

THREE separate setps, all providing for the additional use of natural rubber in some products or for the initial use of such rubber in other products, and all intended to relieve the critical situation in the supply and consumption of GR-S, were taken by the Civilian Production Administration in recent weeks. Action was taken by Congress to block immediate disposal of the various synthetic rubber copolymer and raw materials plants for a period of at least six months. Negotiations between the United States and Great Britain, the Netherlands and France on the price of rubber to be paid by the United States for the period from July 1 to December 31,, 1946, resulted in an agreed-upon price of 23½ cents a pound, an increase of 3¼ cents over the price of 20¼ cents per pound paid during the first six months of the year.

The first step in the general plan to make more natural rubber available to the industry occurred on June 21 when CPA announced that tire manufacturers will be permitted to use larger amounts of natural rubber in making tread repair stock and stripping stock. This change was accomplished in Amendment No. 2 to Rubber Order R-1 as amended March 1, 1946, and Rubber Order R-1, Appendix II, as amended June 21, 1946.

The same revisions established a procedure under which cement for the manufacture of new shoes can be obtained and revised the regulations governing the use of such cement. Minor changes were also made in Codes 1 and 3 of Table B (Permitted Products) and Code 13-A (Insulation Compounds), as well as in the definitions and markings of tires and tubes. Although these changes permitted an increase of 12% in the amount of natural rubber permissible in the manufacture of tread repair stock of 1/16 inch gauge and an increase of 10% in stripping stock, a subsequent revision under date of July 12 permitted the use of any desired amount of natural rubber in the manufacture of these tire repair materials.

Additional Allowances Made

On July 9, CPA issued Amendment No. 3 to the Rubber Order providing for the allocation of an additional 12,000 long tons of natural rubber for the second half of the current year. This amendment increased the allowable percentage of natural rubber permitted in a substantial number of rubber products and provided a specified amount of natural rubber for several products previously limited to synthetic rubber. Some of these changes accomplished by amending Table B (Permitted Products) of Appendix I follow:

1. Natural rubber to a maximum of 35% is now allowed in conveyor and elevator belting and pulley lagging.

2. Natural rubber may now be used in V-belts as desired, contrasting with the previous allowance of 12 to 18%.

3. Contoured automotive floor mats, previously a non-permitted item, may now be made with 10% of natural rubber.

4. Print blankets for textile printing, previously permitted no natural rubber, are allowed any amount desired.

5. Surgical tape and adhesive bandages may now be made with up to 25% natural rubber, an increase of 10%, while an increase of 15% in natural rubber content is permitted for water bottles and combination syringes.

6. Squash and hand balls previously permitted no natural rubber may now use up to 65%.

7. Substantial increases in the amount of permissible natural rubber are provided for rubber industrial hose of various types.

Increases Provided for Tires

The third step was announced on July 12 with the issuance of Amendment No. 2 to Appendix II of the Rubber Order. Under this amendment the natural rubber content of passenger, motorcycle, small tractor, implement and industrial pneumatic tires has been increased 10.5%, raising such percentage to 13%. However, other pneumatic tires, such as bicycle, will continue to be made with 2½% natural rubber.

Pneumatic casings with cross section of 8.25 inches and larger of both highway and mud-and-snow tread design may now be made with 94% of natural rubber, while the same percentage may be used in the production of large airplane tires for transport and bomber service and for logger and off-the-road service tires. In many sizes this is an increase from the 67% formerly allowed.

Smaller truck and bus tires and smaller size special purpose tires 7.50 inches and down will hereafter contain 67% of natural rubber, where various tires in this group formerly were permitted 13, 23 or 33% of natural rubber only. These tires, as well as those mentioned above (8.25 inches and larger), will have no special identification in the way of a letter or number marking in the future. Contrary to rumor, no change is made in the restriction that all pneumatic tires shall be manufactured with black sidewalls only.

In addition to allowable increases in tires, the amendment also provided for the use of more natural rubber in footwear and in some tire and tube materials and retreading materials, including airplane and large truck tire camelback. The latter may now be made of all natural rubber.

The restrictions covering the amount of natural rubber (by weight) in individual type footwear sizes has been removed and the following statement substituted: "In rubber footwear of all types the over-all monthly consumption of natural rubber and GR-S or other synthetic rubbers, except neoprene, shall not exceed the ratio of two-thirds natural rubber to one-third synthetic rubber." The amendment also provides that "no type of rubber footwear shall contain more than 98% of natural rubber."

Additional Increases Provided

The same amendment specifies that natural rubber may now be used in the manufacture of "puncture seal" and other types of safety tubes, that tire manufacturers may now use natural rubber latex without limit for the treatment of nylon cord, and that all types of tube patches may contain any amount of natural rubber. It also provides that tread repair stock and stripping stock, previously restricted as to permissible amount of natural rubber, may now use such rubber as required.

The major reason behind these various steps increasing permissible amounts of natural rubber to be used in various products, according to W. James Sears, Director of the CPA Rubber Division, is the necessity for curtailing the consumption of GR-S which has become scarce "because grain and molasses are necessary to alleviate starvation in many countries and hence are not available as raw materials to produce industrial alcohol for butadiene." Mr. Sears em-

phasized that the plants making butadiene from petroleum are being operated at maximum capacity and will continue at this rate for many months to come.

Another step in the conservation of GR-S was authorized on June 14 with the placing of a 30-day inventory limit on this type synthetic. The inventory limit was accomplished in a revision of Priorities Regulation No. 32. The unprecedented demand for passenger car tires, the production goal for which is now over 69,000,000 units for 1946, is responsible for many of these conservation steps.

Place Control on Rayon Cord

To overcome maldistribution of high tenacity rayon cord and yarn and to distribute such cord and yarn equitably throughout the tire manufacturing industry, rigid control was placed on distribution by CPA on July 3. The new channeling procedure, covered by Amendment No. 1 to Appendix II of Rubber Order R-1, as Amended June 21, will be accomplished in three ways: (1) By limiting the inventory of large tire companies, (2) By certifying all orders placed by tire producers with the manufacturers of cord and yarn, and (3) By removing two sizes of passenger tires from Group A and transferring them to Group B. Effective August 31, consumer's inventory of rayon tire cord and yarn is limited to 60 days supply. Manufacturers of rayon cord and yarn are not permitted to honor non-certified orders until all certified orders are met.

The order of preference and type of product that may consume material bought by certification covered by Group A of List 15 of Appendix II follows: (1) airplane tires, (2) self-sealing fuel cells, (3) bullet-sealing hose, (4) combat (U.S.) tires, including only cross-section 8.00 and larger, (5) mileage contract bus tires (inter-city bus tires, city bus tires), (6) synthetic special purpose tires, including all tread types of rock service, logger, earthmover, and 18.00 and up, mud-and-snow, in all sizes, (7) synthetic truck and bus tires, 10 plies and more, (8) belts, (9) tire repair materials, (10) synthetic truck and bus tires, 6 and 8 ply, (11) synthetic tires including road-grader (all tread types and all sizes), tractor implement and pneumatic industrial (all tread types and all sizes), and passenger (all tread types in sizes larger than 6.50 cross section).

Passenger car tires now listed in Group B in which rayon tire cord and yarn may be used after all certified orders have been filled are all tread types 6.50 in cross section, including the 6.25/6.50 cured in the 6.50 mold.

Fail to Block Sale of Plants

As briefly reported in our previous issue, the sale to private industry of the majority of plants used in the government's wartime synthetic rubber program was proposed in a report made to Congress on June 18 by the War Assets Administration. The report covered 15 copolymer and 13 butadiene plants representing an aggregate government investment of $488,000,000. Previously, WAA had recommended the disposition of 10 specialized plants, including the butyl and neoprene plants.

In its report, which was the third and final one made to Congress on disposal of synthetic rubber plants and facilities, WAA pointed out that the submitted program was designed "to permit disposal of the plants at the earliest practicable date subject only to such conditions as are believed to be necessary to protect the national interests in synthetic rubber production." As previously reported, the plants are put under the categories of "basic" and "fringe" with definite conditions of sale pertaining to plants in each category. The report also indicated that both the War Assets Administration and the Office of Rubber Reserve had already begun negotiations with private parties interested in acquiring certain plants.

However, the Surplus Properties Sub-Committee of the Senate Military Affairs Committee on July 2 recommended to Congress that only part of the government-owned synthetic rubber facilities should be sold immediately while the remainder should not be disposed of until six months after a national rubber policy is established. This sub-committee report suggested that the styrene, carbon black, furfural and two alcohol-butadiene plants be sold immediately, as well as 20% of the copolymer productive capacity. The sale of plants for producing butadiene, neoprene and butyl was to be held in abeyance. The sub-committee stressed the point that there is no immediate urgency for disposing of the plants inasmuch as the patent picture affecting the facilities "is rather complex and will render it difficult for companies other than the present operators to bid on these plants until patent agreements can be negotiated."

On July 11 the Senate passed and sent to the House legislation delaying sale of the rubber plants until six months after final plans for their disposal are filed with Congress by the War Assets Administration. Passage of this legislation by the House, however, was blocked by Representative Walter, of Pennsylvania, on July 17, and since that was the last day on which such legislation could be enacted, the government is free to dispose of all the synthetic rubber plants.

In the meantime, on July 9, four styrene plants were declared surplus by WAA and offered for sale or lease. Closing date for bids was July 15. These plants included those at Kobuta, Penna., operated by Koppers; Texas City, Texas, operated by Monsanto Chemical; Velasco, Texas, operated by Dow Chemical; and a Los Angeles unit, also operated by Dow Chemical.

A portion of the butadiene plant at Port Neches, Texas, operated by the Neches Butane Products Co., an organization representing the interests of several large petroleum companies in the Texas area, was also recently offered for sale or lease by WAA. The portion of the plant offered was that used for fabricating of various types of vessels used in the distillation and processing of butane. Total government investment in buildings, machinery and equipment is estimated at approximately $1,000,000.

A bid for the government-owned ferro-silicon plant at Ashtabula, Ohio, was recently made by the Union Carbon & Carbide Co. The Office of Rubber Reserve has requested that if the sale is consummated, production at the plant which has been dormant for the past few months be resumed as soon as possible because carbide is badly needed to make neoprene.

Late Price Decisions

Just prior to its official demise, the Office of Price Administration issued the following price rulings of interest to the rubber field:

Ceiling prices for passenger car and motorcycle replacement tires were increased at manufacturing, wholesale and retail levels by amounts equal to 3.3% of previous retail ceiling prices by Amendment No. 11 to R.M.P.R. 143 and Amendment No. 7 to R.M.P.R. 528, both issued on June 18. At the same time, and by the same amendments, manufacturers' and wholesalers' ceilings for truck, bus and industrial replacement tires were increased by the equivalent of 1.4% of the previous retail ceilings. No change was made in retail ceilings for these tires.

Price control on government purchases of all military equipment containing rubber, such as life rafts, pontoons, airplane parts and service clothing, was suspended on June 27 by Amendment No. 31 to Supplementary Order 129. Insulation cambric and separator cloth were also suspended from price controls on June 5.

A slight change in the formula for determining manufacturers' ceiling prices on specialty bathing caps similar to those produced in March, 1942, was made on June 10 by Amendment No. 1 to Revised Order 117 of M.P.R. 220. The change allowed manufacturers, as an alternative, to add to the dollar-and-cent ceilings for basic bathing caps of the same type the difference between their current factory costs of the specialty cap and of the basic cap.

The differential between ceiling prices of gas sold for use in carbon black manufacture and gas sold to pipe lines for light, heat and fuel, was eliminated by Amendment No. 24 to R.M.P.R. 436. The effect of this move was expected to raise the ceiling for gas used in channel black production from the previous base of 2.12 cents per thousand cubic feet to a maximum price of 6 cents. It was pointed out that a majority of contracts with channel black manufacturers are now being negotiated at an average price of 4.75 cents per thousand cubic feet of gas.

NEW INTERNATIONAL AGREEMENT REACHED ON NATURAL RUBBER PRICE

Announcement was made by the U. S. Department of State on June 20 that a fixed basic price of 23½ cents a pound has been set by the United States, the United Kingdom, the Netherlands, and France for the purchase of natural rubber for the period from July 1 through December 31, 1946. This compares with a price of 20¼ cents per pound paid under agreements which expired on June 30. The official announcement of the Department of State follows:

Agreements have been reached after discussions between the United States Government and the Governments of the United Kingdom, the Netherlands, and France, regarding the purchase of natural rubber from British, Netherlands and French Far Eastern sources for the period July 1 through December 31, 1946. These bilateral discussions, which were carried on in a most frank and friendly spirit, were occasioned by the expiration of the present contracts on June 30, 1946.

The position of each country in relation to rubber was examined most carefully and consideration was given to the immediate difficulties faced by natural rubber producing areas, together with the longer run implications of any price decision at the present time. Determining factors in the agreements reached were the continuing shortage of natural rubber in relation to demand and the present exceptionally high costs of producing natural rubber in these areas.

In accordance with the agreements reached the Governments concerned will support the continuance of international allocation of natural rubber by the Combined Rubber Committee for the above period.

The United States Government will apply to the CRC for allocations for shipments during this period of 145,000 long tons of natural rubber from British, French and Netherlands sources. Rubber Development Corporation will purchase the quantity of rubber allocated to the United States during this period at a fixed basic price of 23½ United States cents per pound f.o.b. Far Eastern ocean ports for No. IX ribbed smoked sheet and other grades at agreed differentials. In order to ensure the ready movement of rubber and the economical use of go-down and shipping space the Government of the United Kingdom will be constantly in the market to buy rubber in British Far East territories at a price equivalent to that indicated above.

The present arrangements whereby the Government of the United Kingdom purchases all rubber for export from Malaya and resells to the United States or other governments will cease from the end of June, 1946, in respect to shipments elsewhere than to the United Kingdom. From July 1 to December 31, 1946, the United States will be able to purchase rubber from Malaya in such manner as they may desire. The Governments of the Malayan Union, Singapore Colony and the British Dependencies in Borneo have been requested to prohibit the export of rubber except under license and to relate the amount licensed for export to each destination to the quantity determined by international allocation.

United States arrangements for procurement in Netherlands and French Far East territories are at present under discussion. Further consultations will be held from time to time as may be necessary on the detailed arrangements required to carry out this agreement. The arrangements already in force for the purchase of rubber from Ceylon will of course continue to the end of September, 1946. A further statement regarding the position in Ceylon after that date will be made in due course.—End of statement.

Announcement of the higher price to be paid by the United States for natural rubber from the major rubber-producing countries had no immediate effect on the price of that rubber to domestic rubber manufacturers. There is, however, some question as to whether the subsidized price of 22½ cents a pound will be continued or whether it will be increased to cover the higher cost now being paid by the government. Officials of the Reconstruction Finance Corporation have indicated that no decision in this respect will be reached until the ultimate fate of the OPA is determined.

RDC Will Entertain Offers

As a subsequence of the purchasing arrangement reached with Great Britain and those pending with other rubber-producing countries, the Rubber Development Corporation, the duly authorized RFC subsidiary for the foreign purchase of rubber, has established a procedure under which it will entertain offers of natural rubber for shipment from rubber-producing areas. The gist of this procedure is as follows:

(1) All importers and importing manufacturers desiring to do so may sell natural rubber direct to Rubber Development in such aggregate quantities and at such prices f.ob. Far Eastern port as established in the agreements between Rubber Development and the governments of the producing countries. Final LIPE 8-9 O. S.
determination of the quality and weights of this rubber shall be based on inspection upon arrival at U. S. port.

(2) For these services such importers and importing manufacturers shall receive a commission of ⅛ cent per pound ($2.80 per long ton), of which commission $1.00 per ton shall be withheld until any claims or adjustments covering any differences between quality and weights as declared by the seller and quality and weights as determined by inspection at U. S. port shall have been collected by the seller from the Far Eastern shipper and paid to Rubber Development.

(3) In order to relieve Rubber Development of as much detail as possible, purchases in the Far East will be financed by importers and importing manufacturers through their own letters of credit, without the guarantee of Rubber Development. However, the charges for such letters of credit will be reimbursed by Rubber Development in an amount not in excess of ⅛ of 1% plus cable charges, if any, for opening the credits.

(4) Insurance will continue to be carried by Rubber Development, but importers and importing manufacturers must declare shipments for insurance purposes.

Activity in the Netherlands

According to a report from Batavia, restoration of some 50,000 acres of rubber between Batavia and Buitenzorg, 30 miles to the south, is well under way under the direction of the Netherlands Indies Rubber Fund. Dutch experts predict that initial tapping of the trees will result in yields of about 900 pounds to the acre, principally because of the long rest the trees have had during the Japanese occupation and since. Most of the area is broken up into small plantations, averaging about 750 acres each, most of which are owned by Chinese.

The reconstruction work on some of these is so far advanced it is expected tapping will start soon on them, while virtually all the plantations in the area are expected to be working at full capacity by the end of the year.

Complete factory installations, purchased mostly in the United States by the Rubber Fund, are being provided the various plantations, and the fund's experts are making regular inspection tours of all plantations in the area collecting data on required materials and organizing the rehabilitation work.

Principal obstacle to more rapid reconstruction of the plantations continues to be transportation of materials and labor to the plantations as well as of raw rubber from them.

Other Natural Rubber Activities

Rubber-procuring activities of the Rubber Development Corporation are rapidly drawing to an end in Brazil. Offices in Rio de Janeiro and Manaos have already been closed and the main office at Belem will be closed in the near future. A special deal was consummated under which RDC sold most of its equipment in Brazil, including tractors, trucks, tools, etc., to the Brazilian Banco de Credito de Borracha (Rubber Credit Bank). RDC officials indicated that they received "a fair return" on the sale of this equipment.

According to press reports, the rubber purchasing unit set up in Burma by the British Ministry of Supply to purchase all Japanese-produced rubber stocks and new output for shipment to Britain has bought up approximately 3,000 tons to date, of which slightly more than 1,000 tons have been shipped.

A work and acid suit made of Koroseal has been added by Goodrich to its line of industrial clothing. It is said to be resistant to abrasion and practically all solvents and acids.

COMMERCE DEPARTMENT ISSUES REPORTS ON GERMAN INDUSTRY

Data on German synthetic rubber production, including an account of German wartime research and descriptions of manufacturing methods, are contained in nine reports now on sale by the Office of the Publication Board, Department of Commerce. These reports were made for the Office of Rubber Reserve of the Reconstruction Finance Corporation by investigators for the Technical Industrial Intelligence Branch, Department of Commerce. A brief description of each follows:

PB-13340 (photostat, $6; microfilm, 50 cents; 76 pages; April, 1945) summarizes technical details of the production and use of synthetic rubber. It contains data on the quality and characteristics of synthetic rubbers and compounding materials, and describes softening procedures. Three graphs and 27 tables are included.

PB-13355 (photostat, $4; microfilm, $1; 54 pages) contains three translated reports by an I. G. Farbenindustrie expert on the progress of the synthetic rubber program in Germany. Theory and production details, and the application and use of synthetic rubbers are discussed. Illustrative graphs and charts are included. The reports are dated September 26, 1940; May 28, 1942; and March 1, 1944.

PB-13356 (photostat, $2; microfilm, 50 cents; 22 pages; Sept., 1945) describes the large research laboratory and experimental tire plant of the I. G. Farben plant at Leverkusen. Test data on polymers, copolymers, regulators, emulsifiers, and information on Buna SW and Saurem Buna are contained in the report.

PB-13357 (photostat, $1; microfilm, 50 cents; 13 pages; Sept., 1945) describes production processes for Buna S-3, styrene, and intermediate products at the I. G. Farben plant at Huels, the second largest synthetic rubber plant in Germany. The plant had a capacity of 4,000 tons of Buna S-3 a month.

PB-13358 (photostat, $2; microfilm, 50 cents; 19 pages; Sept., 1945) contains a detailed description of facilities and production processes at the I. G. Farben works at Schkopau, the largest plant in Germany. The plant's capacity was 6,000 tons of Buna S-3 a month.

PB-13359 (photostat, $2; microfilm, 50 cents; 23 pages) is a translation of a German document on the heat stabilization of Buna latices, dated March 6, 1940. It describes the influence of various chemicals on the coagulation of Buna latex under heat.

PB-13361 (photostat, $1; microfilm, 50 cents; 8 pages; Sept., 1945) presents a brief general description of the Schkopau plant, including sections on ethylbenzene and styrene production methods.

PB-13363 (photostat, $1; microfilm, 50 cents; 12 pages; Sept., 1945) is a translation of a German technical paper on the development of a new catalyst to improve styrene yields. The composition and properties of various catalysts are given. A flow sheet showing the utilization of dehydrogenation gas is appended.

PB-13364 (photostat, $2; microfilm, 50 cents; 22 pages; August, 1945) describes the production and purification of ethylene, ethylbenzene and styrene carried out catalytically in the presence of a zinc oxide base. Charts, drawings and flow sheets showing the distillation and production of styrene are included.

Order for the reports should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Coming Events

Sept. 11-13. Rubber Division, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Sept. 20. Philadelphia Rubber Group, Outing. (Site to be selected.)

Sept. 21. Connecticut Rubber Group, Outing. (Tentative.)

Oct. 4. Boston Rubber Group, Copley Plaza Hotel, Boston, Mass.

Oct. 7-12. 34th National Safety Congress, Chicago, Ill.

Oct. 18. New York Rubber Group, Hotel McAlpin, New York City.

Dec. 13. New York Rubber Group, Xmas Party, Hotel McAlpin, New York City.

Increases Carbon Black Output

Godfrey L. Cabot, Inc., Boston, Mass., produced more carbon black by the channel process in May of this year than in any month of its history, according to a report released recently by the company on its production of carbon black during the first five months of 1946. Output of channel black by the Cabot plants during the first five months of 1946 was 40 per cent higher than in the same period in 1945. The manufacture of furnace black for the same five months was 34 per cent above that for last year.

Reprint of Paper on Butyl

A paper on Butyl rubber which originally appeared in a recent issue of *Product Engineering* has been reprinted and made available in booklet form by Stanco Distributors, Inc., 26 Broadway, New York 4, N. Y. Entitled "Butyl Rubber Engineering Data," the paper was prepared by E. N. Cunningham, of Stanco Distributors, Inc., and L. B. Turner, of the Esso Laboratories of the Standard Oil Development Co.

PEAK PRODUCTION AND SALES REACHED FOR CARBON BLACK

In 1945, both production and sales of carbon black exceeded one billion pounds for the first time, according to a statistical report of the Bureau of Mines of the United States Department of the Interior. Production amounted to 1,052,798,000 pounds, an increase of 31 per cent over the 801,860,000 pounds produced in 1944. The rate of output, however, was below demand until early summer when smaller demand for military tires eased the situation. In the late months of 1945, production overtook the rate of sales and producers' stocks increased to 102,005,000 pounds on December 31, as compared with 69,243,000 pounds at the end of 1944.

The production of contact process blacks, that had declined from 1940 through 1943, gained 30 per cent over 1944 to a new record of 538,539,000 pounds. Furnace black output continued its upward trend, increasing 33 per cent to 514,259,000 pounds in 1945, or 49 per cent of total production, compared with 48 per cent in 1944. Texas output of all grades gained 44 per cent over 1944 and equaled 69 per cent of the U. S. total.

Gas consumed in carbon black manufacture increased 21 per cent over 1944 to a new record of 431,830 million cubic feet. The average yield of carbon black was 2.32 pounds per thousand cubic feet of gas in 1945 and 2.20 pounds in 1944. The average value of natural gas used increased to 2.28 cents per thousand cubic feet from 1.62 cents in 1944 and was more than double the average (1.13 cents) of 1941.

Sales to rubber companies increased from 738,029,000 pounds in 1944 to 804,386,000 pounds in 1945 and exports increased 11 per cent to 173,773,000 pounds as shipments to Europe expanded after the war. The average value of carbon black at the plants rose to 4.02 cents a pound in 1945, the highest average since 1929.

There were 58 plants operated in 1945, as compared with 54 in 1944. Two plants, 1 roller in Kansas and 1 channel in Louisiana, were not operated in 1945. Five new channel plants, 2 in New Mexico, 1 in Oklahoma and 2 in Texas, and one new furnace plant in Texas started operations during the year.

Tribute to Rubber Industry

A special tribute to the rubber beach equipment industry was rendered over Station KYW in Philadelphia, Penna., on June 24 in a one-hour radio program entitled "The Valley Forge Caravan." Representatives of the rubber industry who were guests on the program included F. K. Brasted, of the Rubber Manufacturers Association; James Sweatt, manager of the Oak Division of the B. F. Goodrich Co.; H. D. Glass, vice-president and sales manager of Seiberling Latex Products Co.; and Edwin P. Dawson, advertising manager of the Seamless Rubber Co.

STANDARD & POOR'S ISSUES SURVEY ON RUBBER INDUSTRY

A survey on the earning prospects of the rubber industry as a whole for 1946 and 1947 and an analysis of the financial position of eleven individual companies is contained in a report made available recently by the Standard & Poor's Corp., 345 Hudson St., New York 14, N. Y.

According to the report, the rubber fabricating industry is operating at a record peacetime rate. Material shortages may temporarily dislocate production schedules, but the industry's sales this year will be sharply above prewar levels, and new peaks are possible for some of the smaller concerns. Margins will probably be narrower than wartime spreads, the report states, but aided by reduced tax rates, the probable absence of special charges, and the likely reductions or elimination of reserves, year-to-year earnings gains will be sharp.

Reflecting the excellent profits outlook, greatly strengthened finances, and the likelihood of increased stability in future operating results, the report points out that U. S. Rubber, Goodyear, Goodrich, and Firestone have already announced increases in dividend rates, and payments of all companies in the field will be well above those of 1945.

In forecasting the longer-term prospects, it is indicated that demand should continue heavy in 1947 and, as raw materials are expected to be in larger supply, sales and earnings should generally improve over the prospective excellent showing in 1946. However, once the deferred market for tires has been satisfied, it is pointed out, the problem of over-capacity will become acute and a recurrence of the disastrous price wars characteristic of the tire industry in the past is a distinct possibility. A straw in the wind in New York City was the weakening in prices of some commercial tires as soon as large supplies appeared on the market.

On the other hand, the report predicts that the underlying growth trend in the mechanical rubber goods field should proceed at an accelerated pace, with the shift of rubber to the category of a relatively stable, low-priced raw material expected to encourage manufacturers to develop new products and enter new fields earlier barred because of price uncertainties. These developments will be beneficial by lessening dependence on the highly cyclical and relatively narrow-margined tire business, the report declares.

Negotiating for New Plant

Dryden Rubber Co., Chicago, Ill., soon expects to complete negotiations for the location of a branch factory in Springfield, Ill., which is expected to employ between 350 and 400 persons. The company reports that the new plant will begin production as soon as equipment is installed and the building prepared for use.

Seiberling Leases Texas Plant

As the first step in its $4,000,000 expansion program, the Seiberling Rubber Co. has obtained a five-year lease from the War Assets Administration of the government-owned war plant at Garland, Texas, which was operated by the Continental Motor Co. The plant, with 260,000 square feet of floor space, will be used by Seiberling for the production of tires, tubes and other rubber products. Necessary alterations of the buildings and the installation of approximately $3,000,000 of rubber manufacturing machinery are under way, with expectations that the plant will be ready for operation in 12 to 14 months. It is anticipated that the plant will furnish employment to 800 people and have a productive capacity in excess of 600,000 tires a year.

Organizes Vulplex, Inc.

Vulplex, Inc., is the name of a new concern on Bates St., North Abington, Mass., recently organized to furnish supplies to shoe manufacturers. Besides regular coating and combining of rubber, pyroxylin and other plastic materials, the company plans to coat and combine sheet materials, such as impregnated paper and fibre board, as well as sheet cork and sponge rubber, offering fabricated stripsoles of almost any make-up for California shoes. The factory is a two-story building with 30,000 square feet of manufacturing space. Officers of the company are Richard K. Patrick, president; Max Lehner, vice-president, and Simon Lubin, treasurer. Mr. Patrick and Mr. Lubin will serve as general manager and sales manager, respectively.

Styrene Plants for Sale

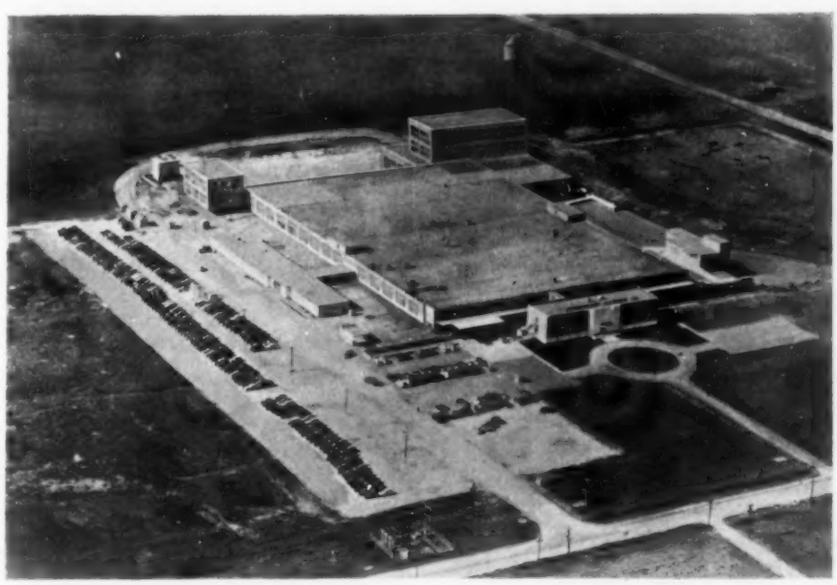
Four completed styrene plants constructed by the Government during the emergency war period have been offered for sale or lease by the War Assets Corporation. The operators of the plants, their location, with the annual design capacity indicated in parentheses are as follows: Monsanto Chemical Co., Texas City, Tex. (50,000 short tons of styrene and 2,000 short tons of toluene); Koppers Co., Inc., Kobuta, Penna. (37,500 short tons of styrene and 80,000 short tons of butadiene from alcohol); Dow Chemical Co., Los Angeles, Calif. (25 short tons of styrene from grain alcohol); and Dow Chemical Co., Velasco, Tex. (50,000 short tons from ethylene).

Establishes New Company

A new company, the Western Rubber Products Co., 5001 Firestone Blvd., South Gate, Calif., has been organized by W. G. Baird and Frank C. Merrell for the manufacture of tire repair materials, camelback, mechanical rubber goods and rubber-covered rolls. Approximately 15 people are employed by the company. Mr. Merrell is in charge of manufacturing and sales.

Fluorine Being Marketed

Fluorine, a gas, said to be the most chemically active element known, has been put on the market for the first time by the Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia 7, Penna. It is available in steel pressure cylinders on a limited commercial basis for experimental use by manufacturers and researchers.



The above is an air view of the new plant of the Seiberling Rubber Co. at Garland, Texas. The former war plant contains approximately 260,000 square feet of floor space, and will employ around 1200 people. The new Texas addition to the Seiberling set-up will manufacture tires and tubes exclusively. The plant is expected to be in production by October, 1947.

1945 ACTIVITIES REVIEWED BY DUNLOP RUBBER COMPANY

A review of activities of the Dunlop Rubber Co., of Great Britain, for 1945, including a brief survey of the company's foreign operations during the year, is contained in a statement issued by the company which appeared recently in the American press.

Reviewing the company's position in Great Britain, the statement points out that although the rubber footwear industry was "concentrated" during the war, a return to normal conditions has commenced. It is indicated that this section of the company's activities will become of increasing importance and hope is expressed that the export markets which were lost to the British industry before the war will be recovered.

Although the company's production of sporting goods was substantially replaced by munitions work throughout the war, it is revealed that good progress has been made in reconversion to peacetime requirements. Reconstruction of the company's clothing factory which suffered severely from enemy action is also said to be making rapid progress.

Another important activity in 1945 was the development of decorative flooring tiles, known as Semastic. This type of flooring is expected to constitute a valuable alternative to high-grade linoleum and rubber flooring.

According to the statement, the company proposed to issue £6,000,000 (approximately $24,600,000) of 3½ per cent of debenture stock at 101 on July 2, 1946. The proceeds of the new stock will be used first of all to repay the existing £2,931,011 (approximately $12,017,145) of 4 per cent debenture stock. The balance of the money will be used for the capital expenditure and expansion schemes of the company at home and abroad. The new stock will be subject to drawings and redemption terms on the same lines as the 4 per cent stock, the full term running until 1982.

Turning to the operations of Dunlop's subsidiaries in Europe, it is indicated that the company's French plant made a substantial profit in 1945, thus recouping prior losses and approaching its 1939 level of production and sales. The capital expenditure required for the restoration of assets in this plant has been financed entirely in France. Since the company's German factory is in the American Zone of Occupation, it is pointed out that Dunlop has not yet been able to take any part in its management. Even less contact is had with the Japanese subsidiary.

In the Western Hemisphere, the Dunlop Tire & Rubber Co. in the United States is said to have had a very successful year in 1945, while the Dunlop Tire & Rubber Goods Co., Ltd., in Canada is reported to be making satisfactory progress towards reconversion, with a net profit in 1945 slightly better than in the previous year.

German Industrial Capacity

According to the most recent directive from the Four-Power Allied Control Council on how much industrial capacity Germany may keep under the Potsdam agreement, the German rubber industry will be left the capacity to process 20,000 tons of reclaimed rubber and 30,000 tons of natural rubber annually. The Control Council's program leaves Germany a total industrial capacity with which to produce approximately 75 per cent of her 1936 industrial output, or perhaps between one-third and one-fourth of her war production level. Putting the Control Council's industrial program into effect is expected to take about two years. At Potsdam, the Big Three directed that the physical removals of surplus plants be completed within two years of the decision on Germany's peacetime level of industry.

Other foreign subsidiaries of Dunlop which are reported to have made satisfactory progress during the year are those in Ireland, Australia, India and South Africa. It is also indicated that Dunlop is going ahead with the construction of a plant in New Zealand.

Builds Tire Plant in Sweden

The construction of a tire factory, 70,000 square feet in area, is nearing completion in Sweden by Trelleborgs Gummifabriks Aktiebolag, that country's leading rubber manufacturer. Production is expected to begin during the last six months of this year. It is estimated that Sweden's total output capacity for tires will amount to about 2,000 average size tires a day by the end of 1946. As the maximum demand is approximately 600,000 tires a year, domestic production will thus be able to meet the country's normal requirements. Stocks of tires were greatly reduced during the war, however, and there is a very large immediate demand that can be satisfied only by imports.

Issues Standards Booklet

A revised list of standards has been made available by the American Standards Association, 70 E. 45th St., New York 17, N. Y. The 845 standards listed in the booklet include definitions of technical terms, specifications for metals and other materials, safety provisions for the use of machinery, methods of work and methods of test for the finished product. The Association has also published its 1945-46 Year Book, which presents information about the A.S.A., a listing of approved American standards, and projects under development, together with the scopes of these projects.

BRITISH TRADE ASSOCIATION HOLDS FIRST ANNUAL MEETING

The National Reclaim and Allied Rubber Trades' Association held its first annual general meeting on June 7 at the Wool Exchange in London, England, with John Lewis, M. P., chairman of the Association, presiding.

In his report on the progress so far achieved by the Association, Mr. Lewis prefaced his remarks with a short survey of conditions in the industry both during and prior to the war, and stressed the point that until the Association came into being in May, 1945, the smaller firms in the industry had not been represented. A number of these firms had come into being during the war, and the Association was urgently needed to give them a voice in the various consultations which went on from time to time with the Government, trade unions and other bodies, he said.

Mr. Lewis then outlined the various functions the Association aimed to perform and reviewed the progress made to date. He revealed that the Association had undertaken negotiations concerning wage rates and had formed the opinion that the rates current in certain sections of the industry were too low. Action would be taken to secure an increase of such wage rates, he said, in order to secure a greater measure of uniformity throughout the industry.

Referring to reparations, Mr. Lewis reported that a study group had spent several weeks in Germany inspecting reclaiming and other machinery and had brought back full details of the machinery available. Subsequently, the Allied Control Commission had ruled that none of the machinery should be removed. He thought this decision a great error of policy, since there were many small firms urgently in need of some of the types of machinery which were available, and suggested that the Association make representations to secure a reversal of present policy.

Mr. Lewis also referred to the shortages of such materials as china clay and carbon black. He suggested that the Association should consider making strong representations to the Government regarding these shortages, which were said to be partly due to the failure of the Government to take appropriate action.

During the course of the meeting a resolution was introduced and adopted to the effect that the British authorities be urged to take immediate steps to set up plants for the production of carbon black especially in "oil-producing territories in the sterling area where natural gas is available and is at present going to waste."

A revived and completely revised Statistical Section containing information of interest to all branches of the industry, will be found in this issue beginning on Page 492.

RUBBER DIVISION MEETING NOW DEFINITE FOR CHICAGO

Official confirmation to the effect that the Fall Meeting of the Division of Rubber Chemistry of the American Chemical Society will be held in Chicago, Ill., on September 11, 12 and 13, in conjunction with the 110th Meeting of the parent society, has been made. The exact number of sessions to be held will be determined by the number of papers submitted.

Divisional headquarters will be at the Hotel Sherman, where the technical sessions will likewise be held, and those planning to attend are urged to make immediate reservations.

Local arrangements for the Chicago meeting have been placed in the hands of a special committee of the Chicago Rubber Group, under the chairmanship of Francis S. Frost, Jr., of the Frost Rubber Works. The Divisional banquet will be held on Thursday evening, September 12, at the Sherman.

As usual, papers were invited dealing with some aspect of the science and technology of natural or synthetic rubbers for presentation at the technical sessions. Abstracts of 200 to 250 words were to have been submitted in triplicate to the secretary of the Division, H. I. Cramer, Sharples Chemicals, Inc., 123 So. Broad St., Philadelphia 9, Penna., by July 14.

As previously reported, the Division is again collaborating with other divisions of the society in sponsoring the High Polymer Forum. Abstracts of papers intended for presentation at this Forum were to have been submitted to Dr. Cramer by July 5.

Leases Buildings in Indiana

U. S. Rubber Co. has signed a three-year lease, with option to buy, on two factory buildings in Washington, Indiana. The two buildings, with 90,000 square feet of manufacturing area, will be used for the production of waterproof clothing and in full operation will employ approximately 750 people. Production in one plant is expected to start at the end of March with 160 men and women. A two-shift operation with 300 people will be started as soon as materials are available. Operations in the second plant are expected to start about October 1, after a new boiler and vulcanizer building have been erected. This plant in full operation will employ about 450 people.

New Thread Company Formed

The Globe Manufacturing Co., with office and factory at 221 Pleasant St., Fall River, Mass., was recently organized for the purpose of manufacturing extruded synthetic rubber thread of various gauges. Thomas A. Rodgers is president and general manager of the concern and Michael J. Regan is treasurer. Plans also call for the manufacture of several other types of rubber products.

Appointed Chief Chemist

John G. Harrison

John G. Harrison, Jr., formerly associated with the Vulcan Proofing Co. and previously with the Firestone Tire & Rubber Co., has been appointed chief chemist of the Trenton (N. J.) Division of National Automotive Fibres, Inc. Mr. Harrison recently completed a program of research in the Polymer Laboratories of the Brooklyn Polytechnic Institute, for which he was awarded a Ph.D. degree.

New Resin Emulsion

A new resin emulsion, designed for use in the plasticizing of Buna N films and the polyvinyl chloride latices, such as the Geon latex series used in the treatment of fibers and in the coating of fabrics and paper, has been introduced by the Resinous Products & Chemical Co., Philadelphia, Penna. Called Emulsion G-25, it is a white, medium to low viscosity fluid with the following physical properties: Solids, 48 to 52%; pH, 9.0 to 9.5; approximately 8 pounds per gallon. The emulsifying agent used in its manufacture is of the non-ionic type, producing an emulsion with enhanced stability toward electrolytes and an ability to be blended with other emulsions with greater safety.

Talks on Future of Latex

In a recent speech at Ravenna, Ohio, Dr. R. V. Yohe, president of American Anode, Inc., Akron, predicted that the day is not far off when more than half of all rubber products made will be manufactured directly from latex. However, at the present time, he said, means of keeping the latex from solidifying during shipment have not been perfected. Dr. Yohe also forecast that companies manufacturing rubber goods from latex can look forward to a period of prosperity of from five to ten years.

COMMERCE DEPARTMENT ISSUES WORLD RUBBER MARKET REPORTS

As market reports on rubber footwear, soles and heels, belts, belting and hose are received by the Office of International Trade of the Department of Commerce from the United States Foreign Service Missions, they are consolidated, standardized, edited and published in the Industrial Reference Service, Part 8, General Products, on a classified country basis.

For each of the countries in this series there are two Industrial Reference Services—one covering footwear and soles and heels and the other covering belts, belting and hose. The first Industrial Reference Service on rubber products was published in May, 1946.

These reports cover production and consumption of the products in the country discussed, imports from 1938 to the latest year for which figures are available, import duties and regulations, principal channels of distribution, United States exports to the country and prospects for future sales. If the outlook for sales of United States products is not encouraging, the reason is given; if the market is limited, the limitation is explained; if there is a pent-up demand for the products, it is indicated.

The subscription for Part 8, General Products, is $1.50 a year, or 5c a copy. Part 8 also includes products other than rubber, principally consumers durable goods except electrical and automotive. Subscriptions should be sent to the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

Pharis to Purchase Building

The Pharis Tire & Rubber Co., Newark, Ohio, has entered into an agreement with the Reconstruction Finance Corporation to purchase the building on the company's property in Newark which was originally constructed by the Defense Plant Corporation as part of the December, 1944, Military Tire Truck Program. The two-story building of steel and brick construction contains 124,000 square feet of floor space. Although it will be used mainly for warehousing, it is expected that a new laboratory, additional offices and training activities will be accommodated in the new building. However, many legal details remain to be completed before Pharis takes physical possession of the government building.

Flintkote Receives Naval Award

The Flintkote Co. has received the Navy Department Bureau of Ordnance Development Award for distinguished service in the research and development of naval ordnance during World War II. The award was granted in connection with the company's research and development of a cavity hot melt for lining explosive devices.

LIST OF TECHNICAL REPORTS AVAILABLE FROM COMMERCE DEPARTMENT

During the past year, government and industrial investigators have been gathering information and writing reports on the industrial and technical developments achieved during the war in Germany, Japan and other enemy nations. In addition, some of the achievements accomplished in the United States, England, Canada and other of the Allied countries, most of which came under the "secrecy" orders during the war, are now being made public.

The availability of these various reports is currently being announced by the U. S. Department of Commerce in the "Bibliography of Scientific and Industrial Reports." This bibliography, issued weekly, lists the latest reports available, dividing them into subject classifications for convenience. It may be secured on a subscription basis from the Superintendent of Documents, Washington, D. C., at a cost of $10.00 per year.

For the convenience of our readers, we will publish from time to time information relative to those reports which are of special interest to the rubber industry. Information furnished will include the title of the report, author (if any), serial number, length, and price. When the title of the report is not sufficiently explanatory, a line or two outlining its specific contents will be added. Copies of any report listed may be secured from the Office of the Publication Board, Department of Commerce, Washington, D. C. Remittances, made payable to the "Treasurer of the United States," must accompany orders.

Titles of some recent reports follow:

Manufacture of Pressure Sensitive Adhesives and Allied Products at P. Beiersdorf & Co., A. G., Hamburg. By Eustis Warner.—Report No. PB 2454. 11 pp. Photostat, $1; Microfilm, 50c.

The Influence of Load and Inflation on the Selection of Pneumatic Tires for Military Vehicles. By Karl F. Eklund.—Report No. PB 1662. 105 pp. Photostat, $7; Microfilm, $1.50.

Bibliography—Natural and Synthetic Rubber. By Mattie L. Houghten. The references are arranged under two subject headings, namely, the Statistical Procedure of Sampling and the Physical Methods of Testing Natural and Synthetic Rubber.—Report No. PB 1753. 36 pp. Photostat, $3; Microfilm, 50c.

Rubber Testing—Bibliography, Preliminary Report. By Mattie L. Houghten. An annotated bibliography on rubber aging, including bibliographies and general references on light, oxygen, ozone, sunlight, and ultra-violet light aging of rubber, as well as references on antioxidants and United States and foreign synthetic rubber patents.—Report No. PB 1756. 42 pp. Photostat, $3; Microfilm, 50c.

Japanese Rubberized Impermeable Suits. By L. L. Larson and Shirley W. Randa.—Report No. PB 4522. 29 pp. Photostat, $2; Microfilm, 50c.

Japanese Temporary Rubberized Anti-Gas Cape Model 3, Type 2. By Shirley W. Randa.—Report No. PB 4515. 20 pp. Photostat, $2; Microfilm, 50c.

Synthetic Rubber Plant—Buna Werke-Schkopau, A. G. By J. D. Fennebresque, C. C. Monrad and J. E. Troyan. The manufacturing processes of this plant, which is the largest Buna S plant in Germany, with a rated capacity of 6,000 tons per month, are described.—Report No. PB 512. 65 pp. Photostat, $5; Microfilm, $1.

Deutsche Oelfabrik Dr. Grandel, Hamburg. By W. H. Goss. This report contains a description of the equipment used for the manufacture of brown and white factice in the plant.—Report No. PB 3448. 1 p. Photostat, $1; Microfilm, 50c.

Oppau Works—I. G. Farben, Oppau, Germany, near Ludwigshafen, Germany. By J. W. Livingston. General description of the Oppanol plant for the manufacture of polyisobutylene is given.—Report No. PB 4329. 7 pp. Photostat, $1; Microfilm, 50c.

A Study by the Interagency Committee on the Treatment of the German Rubber and Rubber Products Industry from the Standpoint of International Security. By the U. S. Technical Industrial Disarmament Committee.—Report No. PB 4111. 26 pp. Photostat, $2; Microfilm, 50c.

Shoepacs, All-Rubber, with Rubber-Lining; Comfort, Moisture Disposition and Thermal Insulation of Experimental Item. By Richard O. Morris and Agnes M. Galligan.—Report No. PB 3383. 20 pp. Photostat, $2; Microfilm, 50c.

French Heavy Rubberized Anti-Gas Suit. By Shirley W. Randa.—Report No. PB 4497. 7 pp. Photostat, $1; Microfilm, 50c.

Japanese Rubber Gloves. By Shirley W. Randa and Janice Josephson.—Report No. PB 4500. 8 pp. Photostat, $1; Microfilm, 50c.

The Reppe Butadiene Process; Summary Report. By C. C. Monrad. Pilot plant results of the synthesis of butadiene by the Reppe formaldehyde-acetylene reaction are given.—Report No. PB 4604 (similar to Report No. PB 9693). 20 pp. Photostat, $2; Microfilm, 50c.

Drift of Rubber Life Rafts. By Franklin C. Spinney. Information is presented on the effects of wind, ocean currents and waves on rubber life rafts of various sizes at different loadings.—Report No. PB 5736. 2 pp. Photostat, $1; Microfilm, 50c.

I. G. Farbenindustrie Synthetic Rubber Plant, Ludwigshafen. By Russell Hopkinson and others. Considerable data regarding the manufacturing processes of Buna S in this plant is covered, together with production data and costs. Information regarding Koresin, a tackifier for synthetic rubber, and cords for aircraft tires made from Igamid BS, is also given.—Report No. PB 4287. 42 pp. Photostat, $3; Microfilm, 50c.

Testing of Rubber. By M. J. Brevoort. This report is a compilation and evaluation of the various rubber-testing methods found in literature.—Report No. PB 6254. 20 pp. Photostat, $2; Microfilm, 50c.

Rubber Substitutes for Life Rafts. By C. J. Brick. The views presented at a conference on the use of synthetic rubber in life rafts at the Naval Aircraft Materiel Center in Philadelphia, Penna., on October 29-30, 1943, are presented in this report.—Report No. PB 5743. 3 pp. Photostat, $1; Microfilm, 50c.

Rubber Substitutes for Life Rafts. By C. J. Brick. This report is on a conference with the Office of the Rubber Director, Bureau of Aeronautics, Materiel Command, and industry in New York City on April 18, 1944, relative to the use of synthetic rubber in life raft fabric.—Report No. PB 5744. 3 pp. Photostat, $1; Microfilm, 50c.

Rubber Substitutes for Life Vests. By C. J. Brick. This is a report on a discussion at a meeting in New York City with the Rubber Manufacturers Association, Army Air Forces, Navy Department, and industry on the use of synthetic rubber in life vests and belts.—Report No. PB 5742. 2 pp. Photostat, $1; Microfilm, 50c.

Poppet Valve Rubber Diaphragms. By C. E. Jaynes. Results of tests on three samples of poppet valve rubber diaphragms by the A. A. F. for volume swell are contained in this report.—Report No. PB 6889. 2 pp. Photostat, $1; Microfilm, 50c.

Test on Carburetor Seal Rings. By P. J. Mahoney. This is a report of tests made to determine the volume change characteristics of synthetic rubber carburetor seal rings after immersion in aromatic fuel, No. P.P.F. 813, and after subsequent drying.—Report No. PB 6743. 3 pp. Photostat, $1; Microfilm, 50c.

Comparative Tests on Sample of Reclaimed Rubber and Vinylite. By W. B. Roberts.—Report No. PB 7875. 2 pp. Photostat, $1; Microfilm, 50c.

Tests of Tygon and Koroseal Gaskets for Decontaminating Apparatus, 3 Gal. M1, in DANC, M4. By W. B. Roberts.—Report No. PB 4942. 13 pp. Photostat, $1; Microfilm, 50c.

German Synthetic Insulation for Wire and Cable: Summary Report. By the WPB Rubber Bureau and Office of Rubber Reserve. Methods of applying insulation by strip process and extrusion are outlined, and typical compound formulas of insulation are given.—Report No. PB 5526. 28 pp. Photostat, $2; Microfilm, 50c.

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We introduced semi-reinforcing carbon to the rubber industry at a time when the need was developing for a soft, resilient black which could be used in high loadings. Our first furnace carbon was the prototype of the important SRF class now so widely used with synthetic rubbers.

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NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those listed in our preceding issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue.

X-Number Designation	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-314-GR-S	General, Baytown	6/17/46	Masterbatch containing 50 parts EPC Black and 100 parts of a GR-S-10 type polymer made at slightly higher temperature to normal conversion, with modifier adjusted to a Mooney viscosity of the unpigmented polymer of 35 ± 5.	This polymer is similar to X-297 except for the lower Mooney viscosity. Because of this, superior processing and handling characteristics are to be expected.
X-315-GR-S	U. S. Rubber, Institute	6/24/46	Masterbatch containing 50 parts Silene EF and 100 parts of a 40 Mooney rubber, stabilized with 1.5 EFED.	For use in industrial products and specialties where this type of polymer is desired.
X-319-GR-S	Polymer Corp., Sarnia	6/26/46	Regular GR-S made by continuous pzn. with water to monomer ratio adjusted to increase plant output.	This polymer should have similar properties to regular GR-S.
	The following three polymers are being made and tested at the present time in view of the possible future shortage of DDM:			
X-305-GR-S	U. S. Rubber, Institute	6/19/46	Regular GR-S except MTM modifier is used in place of DDM.	
X-307-GR-S	Goodrich, Port Neches	6/19/46	GR-S-10 except that MTM modifier is used in place of DDM.	
X-318-GR-S	Goodyear, Akron	7/2/46	GR-S made by continuous polymerization with MTM used in place of DDM.	
	Reauthorizations have been issued for the following five polymers which were previously authorized, made and in consumers' tests found advantageous:			
X-222-GR-S	Firestone, Akron	6/26/46	Alum coagulated GR-S made with dehydrogenated rosin soap.	Polymers made with dehydrogenated rosin soap show a quality advantage, i.e., better tack.
X-270 Latex	Firestone, Akron	6/14/46	Formulation similar to GR-S-X-231; 50-55% total solids, no antioxidant, contains non-staining shortstop tuads; manufactured in large-scale batches.	
X-274-GR-S	National Synthetic, Louisville	6/28/46	GR-S-10 shortstopped with sodium sulfide and stabilized with Stalite.	For same purpose use as GR-S-10. Produced for materials where a special non-discoloring antioxidant is required.
X-276 Latex	Goodyear, Akron	6/14/46	Low rosin soap, GR-S latex with a high solids content of 58%.	General purpose use.
X-278-GR-S	U. S. Rubber, Naugatuck	6/21/46	50/50 butadiene/styrene ratio sodium oleate and glue emulsifiers, shortstopped with hydroquinone; 2 parts PBNA antioxidant, alum coagulated.	Use in closure and sealant compounds.

A retail catalog, believed to be the first of its kind, has been made available to private plane owners by Firestone. It lists such items as aircraft tires, tubes, wheels, brakes, brake lining, aircraft dopes and finishes, tools, instruments, clothing, and accessories.

A new, full-color booklet designed to serve as a guide to point-of-sale promotion, and containing suggestions for dealer identification and product promotion, has been issued by the Meyercord Co., Chicago 4, Ill., under the title of the "Meyercord Decalcomania Sign Ad-Visor."

A report on the rubber industry, under date of April 17, 1946, has been issued by the Statistical Department of Harris, Upham & Co., 14 Wall St., New York 5, N. Y. Emphasis is placed on the positions occupied by Goodyear, Goodrich, U. S. Rubber and Firestone.

A special hose designed for spraying fruit orchards and field crops infested with insects has been developed by U. S. Rubber. It is made of synthetic rubber, reinforced with two layers of fabric woven with Ustex, the company's plastic-treated cotton yarn.

"Aldehydes" is the title of a new booklet issued by Carbide & Carbon Chemicals Corp. It presents in detail the properties and specifications of a group of aldehydes, including butyraldehyde, ethylbutyraldehyde, ethylhexaldehyde, ethylpropylacrolein and glyoxal.

A special issue of the *Ford Times*, dedicated to the Golden Jubilee of the automobile industry and the birth of industrial Detroit, has been issued by the Ford Motor Co. Much of the material contained in the issue has been selected from early volumes of the *Ford Times* and other publications.

NEW YORK RUBBER GROUP HOLDS OUTING AT BLASBERG'S GROVE

Approximately 220 members and guests attended the summer outing of the New York Rubber Group, held at Blasberg's Grove in Hawthorne, N. J., on Friday, June 21. The outing, first since 1940, was generally termed one of the most satisfactory held to date by the Group. It got underway early in the afternoon and wound up with an excellent dinner. A full program of sports was enjoyed during the day, with practically every member and guest participating in one event or another.

Seventy-four members participated in the golf tournament which was held at the nearby Orchard Hills Country Club in Paramus, N. J. With 70 contestants drawn out of the field for the kicker's handicap, Sam H. Tinsley (Vanderbilt) captured first prize and Kenneth J. Soule (Manhattan Rubber) was runner-up. Of those remaining in the kicker's handicap, 15 covered the course in less than 100, while 38 garnered a net score of between 70 and 80. Eric Engdahl (U. S. Rubber) won the prize for most pars and birdies with a score of 11, and Sam H. Tinsley (Vanderbilt) and Don Vickers (Goodyear) were tied for second place with 8 each. A special prize of a dozen golf balls was donated by Douglas S. Dilts, of H. N. Richards Co.

Winners of other events follow: *Boccie*—team of Frank D'Asaro (Wolff-Alpert) and Newell A. Perry (Thermoid); *Darts*—Vincent Arch (Vulcanized Rubber), M. R. Buffington (Lea Fabrics); *Horseshoes*—W. F. Lamela (Okonite), H. H. Abernathy (DuPont); *Baseball Throw*—G. N. Brunt (Flintkote), H. H. Abernathy (DuPont) and Frank Tobin (Acme Backing). In addition to these events, M. R. Buffington (Lea Fabrics) led his pick-up team to victory in a softball game, by a score of 14 to 5.

Peter P. Murawski (DuPont) was chairman of the outing committee. Those in charge of the various events follow: *Golf*, Kenneth J. Soule (Manhattan Rubber); *Softball*, William H. Ayscue (DuPont); *Boccie*, James Carroll (R. E. Carroll, Inc.); *Horseshoes*, W. F. Lamela (Okonite); *Darts*, M. E. Lerner (RUBBER AGE), and *Baseball Throw*, William H. Ayscue (DuPont).

Back Numbers Wanted

Various back numbers of RUBBER AGE are desired by subscribers who wish to bind complete sets. These include the following:

June, 1943
February, 1944
October, 1945
January, February, April, 1946

We will pay 50 cents per copy for any of these issues returned to us. Send them to: Circulation Manager, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Carpenter Heads A.S.T.M.

Arthur W. Carpenter, manager of testing laboratories of the B. F. Goodrich Co., Akron, has been elected president of the American Society for Testing Materials. Mr. Carpenter received his B.S. degree in chemical engineering from the Massachusetts Institute of Technology in 1913 and his M.S. in 1914. After serving as city chemist of Alliance, Ohio, and a chemist at the Municipal Water Purification Plant of Akron, Ohio, he became affiliated with the Goodyear Tire & Rubber Co., Akron, and later the Holtite Manufacturing Co., Baltimore, Md., as superintendent. Returning to Goodyear in 1923, he served as development compounder for three years. He has served in his present position with Goodrich since 1928. Mr. Carpenter has been particularly active in the work of A.S.T.M. Committee D-11 on Rubber Products, having been secretary since 1928 and a member of more than ten of its subcommittees, including the Advisory Committee. He served as vice-president of the Society last year.

Establishes New Department

Philipp Brothers Chemicals, Inc., has been organized, with S. Bendheim as president, to operate the chemical department of Philipp Brothers, Inc. Both companies are located at 70 Pine St., New York 5, N. Y. Philipp Brothers Chemicals, Inc., has branch offices and warehouse stocks in Boston, Providence, Hartford, Philadelphia and Baltimore.

GOLF TOURNAMENT FEATURES OUTING OF RHODE ISLAND CLUB

An interesting golf tournament, wtih prizes to the winners of various events, featured the outing of the Rhode Island Rubber Club, held on June 21 at the Wannamoisett Country Club in Rumford, R. I. Approximately 80 members and guests attended the outing.

Winners of the golf tournament were: *Low Gross*, F. F. Salamon (Binney & Smith); *Low Net*, Robert B. Little (Davol Rubber); *Kicker's Handicap*, John E. Manion (Respro, Inc.) and C. L. Kingsford, tied; *Most 4's*, A. L. Bryant and H. Simmons (Hercules Powder), tied; *Most 6's*, R. A. Walker; *High Gross*, Fred Langhorst (Hodgman Rubber).

There were over sixty door prizes distributed at the outing, some of the most outstanding being an overnight bag, a table radio, several savings bonds, a Schick razor, an electric broiler, an electric iron, an electric toaster, a large world globe, a Schaeffer pen and pencil set and a bottle of Scotch.

Companies contributing to the list of prizes follow: Akron Standard Mold Co., American Cyanamid & Chemical Corp., Barrett Division of the Allied Chemical & Dye Corp., Binney & Smith Co., Bunatak Chemical Co., Godfrey L. Cabot, Inc., Cleveland Liner & Mfg. Co., E. I. du Pont de Nemours & Co., W. D. Egleston Co., B. F. Goodrich Chemical Co., Howe & French, Inc., Imperial Paper & Color Corp., Ernest Jacoby & Co., John D. Lewis, Inc., Meyer & Brown Corp., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co.

Also Naugatuck Chemical, New Jersey Zinc Sales Co., Oakite Corp., Pequanoc Rubber Co., Philipp Bros., Inc., A. Schulman, Inc., Scott Testers, Inc., Solar Compounds Corp., Stamford Rubber Supply Co., Stanco Distributors, Inc., Standard Chemical Co., Stanley Chemical Co., Thiokol Corp., Titanium Pigment Corp., United Carbon Co., R. T. Vanderbilt Co., Vansul & Co., L. G. Whittemore, Wilmington Chemical Corp., Witco Chemical Co. and Xylos Rubber.

"Selecting Your Location" is the title of a new booklet issued by U. S. Rubber. It covers traffic habits, congestion and the various factors involved in selecting a business location.

General view of the crowd which attended the outing of the New York Rubber Group on June 21.

BOSTON RUBBER GROUP HOLDS SUMMER OUTING ON JUNE 28

The Boston Rubber Group held its summer outing at the Woodland Country Club in Newton, Mass., on June 28, with approximately 420 members and guests attending the dinner and participating in the golf tournament and other field events. Arrangements for the outing were in the hands of James H. Christopher, Jr., who was ably assisted by Richard K. Patrick, secretary-treasurer of the group, Leo Dunn, George H. Darling, Ralph Huber, Thomas Edwards and Earl W. Diener.

In the golf tournament, the kicker's handicap ended in a ten-way tie with the following seven winners selected: C. H. Hamilton, C. E. Mayerhauser, A. L. Perry, R. Sherry, J. Mason, A. H. Sanford and D. A. Canes. Other winners of the golf tournament follow: *Low Net:* F. H. Langhorst, N. E. Dupree, H. B. Crooks and S. Zulik; *Low Gross:* W. Fuller, F. Bommer, H. D. Bambridge and C. M. Davidson; *Nearest Pin:* F. A. Newman and F. E. Gould; *Longest Drive:* R. M. Maloney; *Most 4's:* W. Bommer and D. Gifford; *Most 7's:* L. E. Packard, W. L. Edgeworth and K. B. Osborn.

In addition to the golf tournament, three other field events were held during the day, including a softball contest which was won by T. C. Ashley's "Bear Cats." Dart throwing honors went to Al Weston, with Harvey Hutchinson and James Mahanna as runners up, while the team of Charles Wilson and Jack Andrews captured the horseshoe pitching contest.

A surprisingly large number of prizes were made available through the cooperation of the following concerns: Advance Solvents & Chemical Corp., Akron Standard Mold Co., Aluminum Flake Co., American Cyanamid & Chemical Co., American Finish & Chemical Co., American Mineral Spirits Co., American Resinous Chemical Co., American Zinc Sales Co., Angier Products Co., Archer Rubber Co., T. C. Ashley & Co., Avon Sole Co., Bakelite Corp., J. T. Baker Chemical Co., Binney & Smith Co., Stewart Bolling & Co., Boston Woven Hose & Rubber Co., Bortman Plastics Co., Brockton Machine Co., Brooklyn Color Works, Bunatak Chemical Co.

Also Godfrey L. Cabot, Inc., Calco Chemical Co., Callaway Mills, Cambridge Rubber Co., Carter Bell Mfg. Co., Chemical & Pigments Co., Cleveland Liner & Mfg. Co., Coaters, Inc., Colonial Beacon Oil Co., Continental Carbon Co., Continental-Mexican Rubber Co., Converse Rubber Co., Cooke Color & Chemical Co., Davol Rubber Co., Deecy Products Co., Delco Rubber Co., Dow Chemical Co., Downer Hunnewell Co., E. F. Drew & Co., E. I. du Pont de Nemours & Co., William D. Eggleston Co., Emery Industries.

Also Farrel-Birmingham Co., Flightex Fabrics, Inc., General Dyestuffs Corp., General Latex & Chemical Co., General Magnesite & Magnesia Co., Givaudan-Delawanna, Inc., Glidden Co., Goodall-Sanford Co., B. F. Goodrich Chemical Co., Haartz-Mason, Inc., Alfred Hale Rubber Co., C. P. Hall Co., Hercules Powder Co., Hird & Conor, Inc., Hodgman Rubber Co., Hood Rubber Co., J. M. Huber Co., Ralph Huber, Hygrade Shoe Finding Co., Imperial Paper & Color Corp., *India Rubber World,* Innis Speiden Co., Ernest Jacoby & Co., Kessler Chemical Co., Keystone Lubricating Co., Lincoln Mfg. Co., D. H. Litter Co.

Also Malrex Chemical Co., Merrimac Chemical, Midwest Rubber Reclaiming Co., Monsanto Chemical Co., Moore & Munger Co., H. Muehlstein & Co., E. Murphy, National Sherardizing & Machine Co., Naugatuck Chemical, Neville Co., New Jersey Zinc Sales Co., A. C. Nispel, Inc., Oakite Products, Inc., Pacific Mills, Inc., Panther-Panco Rubber Co., Pennsylvania Industrial Chemical Co., Pepperell Mfg. Co., Pequanoc Rubber Co., Philipp Bros., Inc., Phillips Petroleum Co., Pittsburgh Plate Glass Co., Plymouth Rubber Co.

Also Quabaug Rubber Co., R. B. H. Dispersions, Raffi & Swanson, Inc., John Royle & Son, RUBBER AGE, Rosenfield Printing Co., A. Schrader's Sons, A. Schulman, Inc., Scott Testers, Inc., Sessions-Gifford Co., Sharpless Chemicals, Inc., Shell Oil Co., Socony Vacuum Oil Co., Stamford Rubber Supply Co., Stanco Distributors, Inc., Standard Chemical Co., Standard Ultramarine Co., Stanley Chemical Co., Stauffer Chemical Co., Stedfast Rubber Co., Stowe-Woodward, Inc., Sun Oil Co.

Also C. J. Tagliabue Mfg. Co., Texas Co., Thiokol Corp., Wm. R. Thropp & Sons Co., Tillotson Rubber Co., Titanium Pigment Corp., Tyer Rubber Co., Turner Halsey Co., Union Bay State Co., United Carbon Co., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., Vansul & Co., Waltham Bleachery & Dye Works, Warwick Chemical Co., Hermann Weber & Co., Weller Chemical Co., L. G. Whittemore Co., C. K. Williams & Co., Wilmington Chemical Co., Charles T. Wilson Co., Windram Mfg. Co., Witco Chemical Co., Woburn Degreasing Co., and Xylos Rubber Co.

Some of the activities which marked the outing of the Boston Rubber Group on June 28 are depicted in the above photographs. (Courtesy, George Warren Smith).

RBH Resin 510

A new processing aid which permits the preparation of synthetic rubber cements by direct solution without milling has been introduced by the R-B-H Dispersions Division of Interchemical Corp., Bound Brook, N. J. Known as RBH Resin 510, the new processing aid is said to improve adhesion, heat stability, solvent release, aging, film strength, resistance to alkalies, alcohol and water, and reduction of nerve of synthetic rubber cements.

CANADIAN RUBBER DIVISION HOLDS FIRST MEETING IN TORONTO

With approximately 350 members and guests in attendance, the Division of Rubber Chemistry of the Chemical Institute of Canada held its first meeting in Toronto, Canada, on June 25. Held in conjunction with the 29th annual conference of the parent organization, the meeting featured the presentation of eight technical papers, four during the morning session and four during the afternoon. Other features of the meeting were a business session and luncheon. Dr. Norman S. Grace, chief chemist of the Dunlop Tire & Rubber Goods Co., served as chairman of the technical session.

The titles of the papers presented at the technical sessions and their authors are as follows: *Synthetic Rubber Research in Canada,* E. R. Rowzee, Director of Research, Polymer Corp., Ltd., Sarnia, Ont.; *Elasticity of Rubber-Like Materials,* L. R. G. Treloar, Senior Physicist, British Rubber Producers Research Association, England; *Rubber Derivatives and Plastic Films for Food Packaging,* H. J. Osterhof, Assistant Director of Research, Goodyear Tire & Rubber Co., Akron; *Statistical Control in the Physical Testing of Rubber,* J. D. Heide, Statistician, U. S. Rubber Co., New York City; *High Frequency Heating in the Rubber and Allied Industries,* G. P. Bosomworth, Manager, Engineering Laboratory, Firestone Tire & Rubber Co., Akron; *The Development of Latex Processes in Great Britain,* E. W. Madge, Dunlop Rubber Co., Ltd., Birmingham, England; *Integration of the Plastics and Rubber Industries,* R. P. Kenney, Manager, International Sales, B. F. Goodrich Chemical Co., Cleveland, Ohio; and *Effect of Varying Monomer Ratio and Conversion on GR-S Type Rubbers,* E. D. Maher and T. L. Davies, Research and Development Division, Polymer Corp., Ltd., Sarnia, Ont.

New Officers Are Introduced

At the business session, the new officers of the Rubber Division, elected by mail ballot, were announced as follows: *Chairman,* Gordon R. Smye, chief chemist of the Firestone Tire & Rubber Co. of Canada; *Vice-Chairman,* Harold G. Deline, chemist of the Dunlop Tire & Rubber Goods Co.; *Secretary-Treasurer,* Roger Hatsch, of Polymer Corp. Members of the Executive Committee include J. C. Howard (Kaufman Rubber), A. B. Lewis (British Rubber) and E. R. Rowzee (Polymer Corp.)

Expansion of the Rubber Division to embrace the field of plastics as well as rubber was also discussed at the business session, but no action was taken on several suggested proposals. It was also indicated that the next meeting of the parent society might be held at Banff in the Province of Alberta, Canada. If the C.I.C. does convene in that western Canadian city, it was stated that the Rubber Division probably would meet elsewhere.

Delivering the opening paper at the technical session, Mr. Rowzee outlined the synthetic rubber research programs in the United States and Germany, briefly touched on the construction and operation of Polymer Corp. and described the Canadian synthetic rubber research organizations and the programs followed by them. Discussing the present research program in Canada, he indicated that research is being financed at Sarnia by Polymer Corp., and at the National Research Council Laboratories and six Canadian universities by grants from the National Research Council. The work in the Research Council and at the universities is directed by the Associate Committee on Synthetic Rubber Research of the National Research Council.

Objectives of Canadian Research

Mr. Rowzee said that the four major objectives of the research program in Canada consist of: (1) The development of an improved tire rubber using information obtained during the past years from the German synthetic rubber industry; (2) The development of improved general purpose and high solids latices; (3) The discovery of new polymers through a better understanding of the methods of polymerization and the structure of polymers; and (4) The development of improved methods of polymer evaluation, the development of new physical tests, and the study of compounding research.

Treloar Discusses Elasticity

Mr. Treloar, the second speaker, discussed the elasticity of rubber-like materials from the standpoint of molecular structure. An abstract of his talk follows:

Of the early theories of rubber elasticity which attempted to explain this phenomenon in terms of the specific structure of the natural rubber hydrocarbon, none were sufficiently well established to claim any general acceptance. Present day ideas spring from the consideration of rubbers as a class, in which a basic similarity of molecular structure is evident throughout a rather wide diversity of detailed chemical constitution. The common structural feature in all rubbers is a long-chain molecule, in which neighboring groups of atoms are connected by single bonds about which relatively free rotations continually occur as a result of the thermal energy of the chain units.

In the absence of external restraints, such a long-chain molecule may be shown by purely statistical considerations to exist in a randomly-kinked form, in which the average distance between its ends is only a small fraction of its fully-extended length. The molecule exhibits elasticity by virtue of this tendency to take up the most probable form, corresponding to the state of highest entropy.

For a material to show rubber-like behavior, it is not sufficient that it should be composed of long-chain molecules of this type. Other necessary conditions are (1) that the forces between molecules should be sufficiently small to permit free rotation of the chain elements, and (2) that the molecules should be joined together at certain points in order to prevent viscous flow. The second condition is normally satisfied by vulcanization. The first condition can be satisfied only over a limited range of temperature. At low temperatures, where the intermolecular forces predominate, all rubbers transform to the glass-hard state.

Rubbers built upon a perfectly regular pattern tend to crystallize, particularly when stretched. This crystallization has a marked effect on tensile strength and other physical properties.

The quantitative treatment of the elasticity of an ideal network of long-chain molecules by the methods of statistical thermodynamics leads to general stress-strain relations for rubber under any type of deformation. These relations have been approximately verified for natural rubber in elongation, compression, and shear. The theory thus promises to give a valuable lead in the development of a general theory of large deformations comparable in importance with the classical theory of small-deformational elasticity.

(EDITOR'S NOTE: Mr. Treloar's paper is scheduled for publication in RUBBER AGE at a later date).

Osterhof Treats with Derivatives

In his talk on "Rubber Derivatives and Plastic Films for Food Packaging," Mr. Osterhof described the requirements, essential physical data, and the advantages and disadvantages of a number of food packaging films, including cyclized rubber (Pliolite), rubber hydrochloride (Pliofilm), regenerated cellulose (Cellophane), cellulose acetate, ethyl cellulose, vinyl chloride copolymers (Vitafilm), vinylidene chloride copolymers (Saran), polyethylene, coated or film laminated aluminum foil, and coated or film laminated glassine or paper.

Regarding the various applications of Pliofilm, Mr. Osterhof stated that one-way or two-way stretched Pliofilm of thicknesses down to one ten-thousandths of an inch is used in packaging, particularly of fresh fruits and vegetables whose metabolism must continue during storage. (EDITOR'S NOTE: This paper is scheduled for publication in the September issue of RUBBER AGE).

Control in Physical Testing

The determination and control of observed variability in test results on rubber was discussed by Mr. Heide in his paper on "Statistical Control in the Physical Testing of Rubber." The test results, he said, obtained from either repetitive tests of a single unit or successive tests of samples drawn from a homogeneous master sample will, under certain delineated conditions, fall into a determinable pattern usually described by a normal distribution. He defined

the standard deviation of this distribution as the testing error of the test, which gives a valid and useful measure of the reliability of the test.

Asserting that knowledge of the testing error and the pattern of variation of test results furnish a scientific basis for controlling and improving test performance in the control laboratory, he then described how the construction and use of control charts can be effectively employed for various physical tests on rubber.

A common reaction to the statistical method, he pointed out, is the feeling that physical testing equipment can be adequately checked and controlled by mechanical means such as calibration with weights and wires. In his opinion, these methods are not adequate and are no substitutes for statistical control.

Bosomworth on Dielectric Heating

Mr. Bosomworth reviewed some of the past developments and present practices in dielectric heating, with particular reference to drying and vulcanizing processes, in his paper on "High Frequency Heating in the Rubber and Allied Industries." He presented some data on the characteristics of materials and the range of constants of the load circuits usually found in applications in the rubber industry, and also made reference to the problems of load handling and maintenance of equipment. Brief mention was made of the radio interference problem and some data on field tests was supplied. (EDITOR'S NOTE: This paper is published elsewhere in this issue).

Latex Developments Reviewed

In his paper on "The Development of Latex Processes in Great Britain," Dr. Madge dealt with certain developments of special technical interest, touched on some matters whose historical aspect is of importance, and mentioned one or two of the more unusual wartime and post-war advances in latex technology in Britain. His remarks covered processes associated with natural latex, emulsion polymers, and artificial dispersions.

In connection with interesting latex processes, Dr. Madge mentioned the dipping process developed during the war for such articles as meteorological balloons. The feature of this process, he explained, is that the former has a small hole in its base so that after a thickness of coagulum has been built up by dipping it is thinned down by inflation by compressed air. He also outlined the early development of latex foam, and briefly described the process.

Dr. Madge then described a process that has descended directly from the latex foam process, namely the latex process for the production of high tear sheeting which was used during the war in certain constructions of self-sealing coverings for aircraft fuel tanks. The process depends on heat gelling a specially compounded latex foam, compressing and washing the uncured sheet in stages, drying continuously, and stoving intermittently. Relative tear strength of such material in comparison with rubber sheet produced by other methods was given.

In the latter portion of his talk, Dr. Madge discussed some of the synthetic and artificial latices. The future, he said, holds hope for a whole new range of raw materials, each of them finding its proper place in economic, logistic and technical grounds. To these will be added new techniques, some of which will benefit from the huge developments made in other fields during the war. In concluding his talk he emphasized that what is required is a maximum uniformity in raw materials, improved control of processes, and above all a greater understanding of the fundamentals involved, which in its turn awaits the tardy but now considerably accelerating development of colloid science.

Kenney Discusses Plastics

Looking into the future of the rubber and plastics fabricating industries, Mr. Kenney, in his paper on "Integration of the Rubber and Plastics Industries," developed the thesis that many phases of these two industries have lost their separate identities due to the fact that their end products, raw materials and interests have become interchangeable. Therefore, he reasoned, their future will depend upon intra-industry cooperative competition rather than inter-industry conflict.

Mr. Kenney then traced the growing interest of the rubber industry in the plastics field. Before the war, he said, the rubber industry accepted synthetic rubber while the plastics industry adopted the elastomeric polyvinyls. He pointed out, however, that after the outbreak of war the rubber industry turned to the polyvinyls when faced with impending raw material shortages as well as the necessity of supplying new and radically different products to the armed forces.

The reasons for the adoption of the polyvinyls by the rubber industry were given as follows: (1) The molecular structure of the polyvinyls and synthetic rubber are similar; (2) The polyvinyls can be handled on standard rubber equipment with only minor adjustments; and (3) The polyvinyls can be used interchangeably with synthetic rubber for certain applications.

The speaker pointed out how the addition of certain vinyl chloride type plastics to acrylonitrile rubbers has resulted in certain improvements in the finished product, such as increased flex life, sunlight and ozone resistance, reduced flammability, reduced creeping in lightly loaded stocks and improved abrasion resistance. On the other hand, the addition of synthetic rubbers to vinyls has produced a thermoplastic compound with superior properties over the pure resin.

Turning to the future economic aspects of both industries, Mr. Kenney declared that when the raw materials of each become interchangeable, they will both be subject to the same economic influences, such as the prices on a hundred and one different synthetic, rubber, plastic and chemical raw materials. Citing another economic consideration which will be influenced by this interchange of interests, he said that the rubber manufacturer will have to judge on a different basis the production costs of his competitors in the plastics industry, particularly costs based on capital investments, overhead and labor.

Varying Monomer Ratio

The final paper, entitled "Effect of Varying Monomer Ratio and Conversion on GR-S Type Rubbers," delivered by Mr. Maher, presented suggestions for improving standard GR-S and for the production of new butadiene-styrene copolymers for special uses. For a given styrene content, the speaker revealed, decreasing conversion resulted in increasing rate of cure, higher tensile, elongation, rebound and improved processibility. With increasing styrene content an improvement was reported in processibility, tensile, elongation and flex resistance at the expense of lower rebound and higher brittle point. (EDITOR'S NOTE: This paper is scheduled for publication in the August issue of RUBBER AGE).

Richardson Speaks at Luncheon

At the official luncheon, held on June 25, William S. Richardson, President of the B. F. Goodrich Chemical Co., Cleveland, Ohio, was the principal speaker. Mr. Richardson decried the dearth of trained chemists and chemical engineers. In the United States, he said, based on a survey reported in 1944, there were 61,000 chemists of whom 10,000 had the Ph.D. degree, 13,400 the Masters degree and the balance the B.S. degree in chemistry. In addition, there were 20,000 chemical engineers of whom 750 had the Ph.D. degree, 1,900 the Masters degree and the remainder the B.S. degree.

The speaker said that although there was a need for 10,000 men a year with degrees in chemistry, reports from 376 institutions indicate that there was a total of only 1,934 chemists actually in training in 1945. There were only 462 chemical engineers in training as reported by 86 institutions.

Mr. Richardson also made a plea for a more thorough cultivation of the fields of basic science. He advocated that more money be spent both in industry and in educational institutions for investigations into pure and fundamental science to feed the applied science laboratories upon which industry has drawn so heavily.

To Produce More Vinylite

Bakelite Corporation has announced that it will manufacture vinylite calendered film and vinylite press-polished sheets at the plant which the company purchased recently near Ottawa, Ill., from the War Assets Corporation. This production will supplement the facilities of the company's main plant at Bound Brook, N. J.

THREE MEETINGS HELD BY CALIFORNIA RUBBER GROUP

The Northern California Rubber Group has held three interesting meetings since our last report. The first two meetings, one on April 25 and the other on May 28, were held at the Hotel Claremont in Berkeley, Calif., while the last meeting was held on June 13 at Angelo's in Emeryville, Calif.

Principal speakers at the meeting on April 25, which was attended by approximately 60 members and guests, were Charles J. Roese, development manager at the Los Angeles plant of the Goodyear Tire & Rubber Co., and Erven White, of the Fiberglas Corp. Mr. Roese spoke on the elements of tire design, including the plies, the bead, the breaker strip and the tread.

In his talk, Mr. White discussed the general product engineering of Fiberglas and described its uses in air filters and in the production of fabrics. Referring to the applications of Fiberglas cloth, he said that when used in low pressure plastic laminates, up to 95 per cent of its strength is available. It was said to have less use in rubber products but may be used in high durometer hose, such as steam hose. However, for such applications special fiberglas cords are required. As such, he said, Fiberglas may be applied in conveyor belts in combination with cotton for such uses as in foundries with hot sand.

Harry Lavender, of the California Research Corp., delivered a talk on "The Manufacture of Butadiene for Synthetic Rubber" at the meeting on May 28. He described the production of butadiene by the alcohol process and three petroleum processes—butane, butylene, and naphtha. Discussing the butane process, he indicated that the Borger, Texas, plant of the Phillips Petroleum Co. uses a single step process in which they rely upon precise fractionation and furfural extraction to separate the butylenes from the reaction products of the butane.

The speaker pointed out that two types of recovery systems were practiced in the butylene process, one system being copper ammonium acetate extraction and the other furfural extraction. In the former system, the C_4 cut is contacted with cold sulfuric acid to remove normal butylenes which form diisobutylene and can be used in making isooctane for airplane fuel.

Three methods employed in the naphtha process were then described. One method involves contact of naphtha at high temperature with steam and hot bricks, producing the following products: ethane, ethylene, C_3, C_4 and C_5. The steam cracking method, which involves contact with steam at high temperature and low pressure in a coil, produces the full range of hydrocarbons including isoprene. The third method, called the "true vapor phase process," involves contact of gas at 900° to 950° F. with propane at 1100° to 1200° F. for a short time.

At the meeting, held on June 13, J. W. Cable, director of research and development and sales manager of the Induction Heating Corp., spoke on "High Frequency Heating—Induction and Dielectric," while J. L. Brady, of the Naugatuck Chemical Division of the U. S. Rubber Co., discussed "Available GR-S Polymers."

Tire Situation

A careful inspection of tires on 16,469 automobiles in 17 different cities recently concluded by field engineers of the Goodyear Tire & Rubber Co., is reported to indicate the following: 41% of the tires now on the road are in good condition and should last out the critical period during which tire supply and demand are being brought into balance; 45% of the nation's passenger tires are, on the average, half-worn, and will not require replacement for some months to come; only 14% of tires in use have smooth treads or are in need of early replacement.

Mattress Production Delayed

Firestone Tire & Rubber Co. has announced that its Foamex mattresses, made of foamed rubber, will not be available to the general public until early in 1947. The scarcity of latex, an acute shortage of cotton yarn used in the manufacture of damask coverings, and difficulties in the development of synthetic and natural latex were cited as the principal causes of the delay. The company expects the sales volume of the mattresses to reach $10,000,000 during the first full year of production.

Buys Cord Fabric Plant

Goodyear Tire & Rubber Co. has purchased the rayon cord fabric plant, which it previously operated for the Government at Decatur, Ala., for $956,720. The acquisition includes the land, plant, complete equipment and machinery. Among recent improvements at the plant was the installation of air conditioning equipment at a reported cost of $250,000. Approximately 150 persons comprise the plant's personnel, which is expected to reach 200 when additional rayon is available.

Major Gay Receives Award

Major Glen Gay, who is associated with the Chemical Warfare Laboratories in Ottawa, Canada, has been awarded the M.B.E. (Member of the Most Excellent Order of the British Empire) by the British Government. In 1945 Major Gay was a member of the Canadian team of scientists who investigated German industry. Prior to the war, he served as chief chemist of the Miner Rubber Co., Ltd., Granby, Quebec.

RUSSIANS INCREASE OUTPUT OF BUNA PLANTS IN GERMANY

Instead of dismantling the Buna synthetic rubber works near Halle, Germany, the Russian occupation authorities have stimulated production to and above the pre-war levels in order to provide heavy reparations shipments to Russia from current production, according to a report which recently appeared in the *New York Times*.

Dr. Johannes Nelles, manager of the Buna plant, told a party of American correspondents that the plant had delivered 2,200 tons of synthetic rubber as reparations during the three months ended on June 30 out of a monthly production of $1,500 tons. This would put the proportion of reparations slightly below 50 per cent. He maintained, however, that he could not give over-all reparations figures. A fraction, ranging up to one-third, of the civilian production is set aside by the Buna Works for interzone trade, in exchange for which hard coal from the Ruhr and tires are received.

Without detracting from the technical achievement, the report points out that the record of the Buna plant—phenomenal by comparison with the limping process in the western zones—has been made possible by the fact that most of the required raw materials for its operation, as well as the operation of many other industries, are to be found in the Russian zone. Officials at the plant also said that food rations were sufficient to maintain very nearly prewar efficiency. Furthermore, the Russians were said to have dealt lightly in denazification, since the Buna plant has ousted only twenty men.

To Produce Permaproof Compounds

Permaproof compounds, developed by Treesdale Laboratories, Inc., Pittsburgh, Penna., for flameproofing and mildew proofing fabrics, as well as making them waterproof, are now being manufactured and sold by the B. F. Goodrich Co., Akron. The two principal types of compounds being produced are the Permaproof "100" series, designed chiefly for treating tent, awning, hatch covers and other outdoor protective materials, and the Permaproof "200" series, designed chiefly for interior fabrics such as curtains, drapes and upholstery fabrics.

Stokes Rubber Shuts Down

Joseph Stokes Rubber Co., established nearly fifty years ago in Trenton, N. J., has announced that it is going out of business because of an eleven-week strike of 650 production workers. The company recently became affiliated with the Thermoid Co. Members of the union went on strike on April 24 for a straight 18½c increase in hourly pay and other contract changes. The company offered 18½c for forty-hour week employees and 13c for those in departments working 48 hours. Dismantling of machinery was already said to have begun.

PASSENGER TIRE PRODUCTION INCREASED 3.85% IN APRIL

Passenger car tire production by American manufacturers climbed to a new peacetime record in April, reaching a total of 5,514,751 units, an increase of 3.85% over the 5,310,273 units produced the previous month, according to the latest statistical report of the Rubber Manufacturers Association. The April output brought the total for the first four months of this year to 20,115,514 units, as compared with the 6,363,854 units produced for the same period in 1945. The April, 1946, production was at the rate of over 66,000,000 units a year.

Production of truck and bus tires decreased .54% in April, totaling 1,368,157 units, as compared with 1,375,571 units produced in March. Production of truck and bus tires for the first four months of 1946 amounted to 5,227,447 units, as compared with 7,004,409 produced in the corresponding period of 1945. Total production of automotive pneumatic tires in March amounted to 6,882,908 units, an increase of 2.95% over the previous month, while the production of passenger car, truck and bus tubes increased 4.70%, from 5,839,622 units in March to 6,114,247 in April.

Keeping pace with increased over-all production of tires and tubes, April shipments of passenger car tires amounted to 5,583,640 units, an increase of 5.32% over the previous month, while inventories at the end of April decreased 2.37% to 2,326,918 units. Truck and bus tire shipments increased 6.54%, from 1,319,358 units in March to 1,405,709 units in April, with inventories at the end of April decreasing 3.16% to 976,873 units. Shipments of passenger car, truck and bus tubes totaled 6,078,948 units in April, an increase of 7.61% over the previous month, while inventories at the end of April amounted to 4,189,533 units, a decrease of 7.29% over the end of March.

Export shipments of all types of tires, with the majority in truck and bus sizes, amounted to 128,431 units in April and represented approximately 2% of total shipments. For the first four months of 1946, export shipments of tires totaled 417,484 units, as compared with 116,418 units in the same period of the previous year.

The report covered only automotive pneumatic casings and tubes. It did not include any statistics on solid tires, or on pneumatic tires for motorcycles, bicycles or aviation, agricultural and industrial equipment.

Firestone Family Makes Donation

At a dinner which launched the memorial foundation drive of the alumni of the University of Akron, held in Akron on June 14, Harvey S. Firestone, Jr., president of the Firestone Tire & Rubber Co., Akron, donated $25,000 on behalf of himself and members of his family. The goal of the drive is $500,000.

Financial Report Winners

In a survey conducted by *Financial World* to select the corporation which submitted the clearest and most comprehensive financial report in 1945, the following rubber manufacturing concerns achieved merit award citations: Hewitt-Robins, Inc., Armstrong Rubber Co., Dayton Rubber Manufacturing Co., General Tire & Rubber Co., Goodyear Tire & Rubber Co., Norwalk Tire & Rubber Co., Seiberling Rubber Co. and Thermoid Co. One of these companies will be awarded a bronze "Oscar of Industry" trophy for the best report in the rubber industry in the final judging which culminates in the Annual Report Awards Banquet at the Waldorf-Astoria in New York City on October 4.

DuPont Issues Technical Reports

A number of new technical bulletins have been made available in recent weeks by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. These bulletins include: *Shrinkage of Mold Cured Elastomer Compounds* (BL-208); *Akroflex C Improves Heat Resistance of Butyl (GR-I) Vulcanizates* (BL-211); and *Processing of Fast Curing Neoprene* (BL-212). Copies are available upon request from the company.

Witresin Rubber Softener

A new rubber softener of the petroleum resin type has been developed by the Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. Known as Witresin, the softener is distinguished from other solid softeners by its comparatively low melting point which is said to be more than 50° below that of standard mineral rubbers. It is also reported possible to employ lower mixing temperatures and to reduce Banbury discharge temperature for formulations containing Witresin instead of higher melting point softeners. The new material has a melting point of 240° to 266° F. and a penetration point at 77° F. of 0-2. It can be obtained in both granular and solid form, the granular in 100 pound bags or hopper cars and the solid in 400 pound drums.

Anchor Rubber Buys Plant

Anchor Rubber Products Co., 1724 Landon Road, Cleveland, Ohio, has purchased the plant at that address, previously occupied by the company under lease, for approximately $100,000. The plant consists of a one-story brick and steel building having 40,000 square feet of floor space. For expansion purposes, the company recently bought a six-acre parcel on the opposite side of the street.

WORLD'S FIRST TWO-WAY CONVEYOR BELT DEVELOPED BY GOODYEAR

Introduction of the world's first two-way conveyor belt highlighted a recent conference held by the Mechanical Goods Division of the Goodyear Tire & Rubber Company at Akron. Designed by C. F. Smith (left) of the belt engineering sales department, these four miniature two-way conveyors illustrate the newest principle in handling bulk materials. The belts are installed in a manner that permits each belt to carry material on the "return run," thus continually utilizing the top cover of the conveyor. The belt has its main application in the steel industry where ore can be hauled in and slag taken out on the "return run." P. D. Suloff of Goodyear's Mechanical Goods design department, is adjusting the conveyor system at one of the several transfer points.

NAMES IN THE NEWS

GEORGE K. FUNSTON, president of Trinity College, Hartford, Conn., has been elected a director of the board of the B. F. Goodrich Co., Akron.

R. P. HENDREN, formerly of the War Production Board, has been appointed director of sales of the new coatings division of the R. M. Hollingshead Corp., Camden, N. J.

T. W. MILLER, JR., recently discharged from the Army with the rank of major, has rejoined the Faultless Rubber Co., Ashland, Ohio, as a vice-president.

JOHN J. HOESLY, factory manager of the Norrkoping, Sweden, tire plant of the Goodyear Tire & Rubber Co., has arrived at the company's home office in Akron on home leave, his first since going overseas in 1938.

DR. G. F. D'ALELIO, formerly vice-president and director of research of the Pro-phy-lac-tic Brush Co. and previously director of the plastics laboratories of the General Electric Co., has been appointed manager of high polymer research for the Industrial Rayon Corp.

GEORGE E. PRICE, JR., purchasing agent for the Goodyear Tire & Rubber Co., Akron, and one of the founders of the New York Purchasing Agents Association, has been awarded the J. Shipman Gold Medal by the National Association of Purchasing Agents.

HARRY N. STEVENS, coordinator of the research division of the B. F. Goodrich Co., was an observer at the atomic bomb demonstration off Bikini Island.

EDWARD F. ROSSITOR, who has been associated with the Goodyear Tire & Rubber Co. since 1927, and has held several posts in the company's mechanical goods division, has been appointed superintendent of the company's mechanical goods plant in Sydney, Australia, succeeding C. H. MAXWELL.

HARRY K. COLLINS, formerly manufacturing manager of the resin and insulation materials division of the General Electric Co., Pittsfield, Mass., has been appointed manager of that division.

R. P. ROSSMAN, who has been head of the rubber research group of Godfrey L. Cabot, Inc., since 1944, and GEORGE J. DUFFY, technical manager of special blacks in the company's research and development department, have both been transferred to the company's plant in Pampa, Texas, where they will serve in production and research capacities.

Appointed Purchasing Agent

Robert K. Spofford, formerly assistant purchasing agent of the Okonite Co., Passaic, N. J., has been appointed purchasing agent by the company. Mr. Spofford will also be in charge of purchasing for the Okonite-Callender Cable Co., Inc., Paterson, N. J. He has been an active buyer for ten years, first with the Continental Can Co., where he served as purchasing agent for the plants in the New York district and later during the war, when he became assistant chief purchasing agent of the Concan Ordnance Co. at Terre Haute, Ind. He joined Okonite in 1943.

JOHN C. MORRIS, assistant superintendent of manufacturing of the Resin and Insulation Materials Divisions, Chemical Department, General Electric Co., Pittsfield, Mass., for the past year, has been appointed superintendent of the divisions.

CLARENCE R. BOLLINGER, vice-president and secretary-treasurer of the Argentine plant of the Goodyear Tire & Rubber Co., has been awarded a 40-year service pin by the company.

ROBERT F. PFISTER, who has been associated with the Goodyear Tire & Rubber Co. since 1939, most recently as a member of the Akron development division, has been named chief compounder at the company's Oxo factory in Lecheria, Mexico.

RALPH C. ZEHNER, until recently engaged in the production of explosives at the Pennsylvania Ordnance Works, and JOHN J. MONTEAN, formerly with the commercial development department of Naugatuck Chemical, have been appointed technical sales representatives of the Naugatuck Aromatics Division of the U. S. Rubber Co. They will make their headquarters in New York and will cover the middle Atlantic states.

WALTER A. HAZLETT, managing director of Goodyear-Great Britain since 1937, and associated with the Goodyear organization since 1906, was recently awarded his 40-year service pin at a ceremony held at the factory in Wolverhampton, England.

OLIVER G. VINNEDGE, formerly vice-president in charge of sales for the Dryden Rubber Co., and associated with that company since 1924, was recently elected vice-president and general manager. JOHN GROOT, with the company since 1921, has been named purchasing agent.

Ryan Resigns from Goodrich

G. K. Ryan, who has been associated with the B. F. Goodrich Co., Akron, since 1911, has resigned as manager of sales for the company's elastic yarn, rubber thread and golf ball products. Mr. Ryan had served with Goodrich in many capacities including those of assistant buyer, supervisor of costs, manager of factory operations in the production of rubber sundries, surgical goods, fan belts, rubber thread, golf balls and elastic yarn. During the war, he directed Goodrich sales to the Chemical Warfare Service. Mr. Ryan is recognized throughout this country and abroad as an authority in the manufacture of golf balls and rubber thread of all types. He has been granted several patents relative to these products.

Named Factory Manager

M. A. Marquette, who has been associated with the rubber industry for over 30 years, both in the United States and Europe, has been appointed factory manager of the Master Tire & Rubber Corp., Findlay, Ohio. Before going to Europe in 1929, Mr. Marquette served as factory manager of the Corduroy Tire Co., Grand Rapids, Mich. He went to Europe as a technical advisor for rubber plants at Liege, Belgium, and Aachen, Germany, directing the overhauling and modernizing of the equipment and production procedure. During World War II, he was engaged by the U. S. Rubber Co., working on the company's conversion to synthetic rubber production.

Edelen Heads Intercontinental

Alexander W. Edelen, Jr., vice-president in charge of operations of the Continental-Mexican Rubber Co., has been appointed president of the Intercontinental Rubber Co., its American subsidiaries, including the Continental Rubber Company of New York, and its principal subsidiary, the Continental-Mexican Rubber Co., while J. H. Linxweiler has been named secretary in addition to his duties as treasurer. Mr. Edelen succeeds C. L. Baker, who has been elected chairman of the board of directors of Intercontinental and Continental-Mexican Rubber Co.

Smith Named Plant Manager

T. W. Smith, Jr., general manager of the Sun Rubber Co., Barberton, Ohio, has assumed the duties of factory manager for the company, with George H. McKiernan assisting him as acting production superintendent. Both appointments became necessary when J. B. Chisnell and C. V. Martin resigned recently as factory manager and production superintendent, respectively.

A new Statistical Section will be found in this issue, beginning with Page 492.

New Navy Specifications

Starting with this issue we will publish each month a list of new or amended specifications on rubber issued by the Bureau of Ships of the Navy Department so that the rubber industry may be kept informed of such specifications. Members of the industry desiring copies of any full specification can obtain it by addressing a request (giving title, number and date) to the Navy Department, Bureau of Supplies and Accounts, Washington 25, D. C. Five specification titles which have appeared since March 1, 1946, are listed below:

Navy Dept. 33T6a, Tips, Rubber (reclaimed) (for tables and benches), March 1, 1946.

Navy Dept. 33R11, Rubber, Synthetic, Gasket (for bolted steel tanks and gasket storage), March 15, 1946.

Navy Dept. 33H18c, Hose, Floater, Non-Metallic, March 15, 1946.

Navy Dept. 33R9, Rubber, Synthetic, Medium Soft; Molded, Sheet and Strip (for airport, hatch, and water-tight door gaskets), May 15, 1946.

BuShips 15C1 (INT), Cables, Electric, Insulated, Shipboard Use; Amendment 5, May 15, 1946.

New DuPont Appointments

Five organization changes in its Pigments Department have been announced by E. I. du Pont de Nemours & Co., Wilmington, Del. Dr. David H. Dawson, who was recently made assistant general manager of the department, has been appointed director of sales, while Dr. James E. Booge, formerly a chemical director of the Krebs Pigment & Color Corp., has been made chemical director of the department, and Dr. E. R. Allen, director of research on colors at DuPont's Newark, N. J., plant since 1923, has been named senior research associate to the chemical director. In addition, I. J. Krchma, formerly assistant director of research at DuPont's Newport, R. I., plant, has been appointed assistant chemical director for white pigments with headquarters at Newport, and Dr. W. F. Spengeman, research supervisor at the Newark plant, has been named assistant chemical director for color pigments with headquarters at Newark.

Improved Leather-Like Finish

An improved type of finishing material said to give either a patent leather or dull finish on both napped and smooth surfaces, and which is applicable for use with both natural and synthetic rubber, has been announced by F. J. Bellac, 323 West 80th St., New York 24, N. Y. The new material is said to work equally well on rubber-coated fabrics or rubber-impregnated paper, as well as with other fibrous materials. A patent on the improved finishing material is pending.

A new Statistical Section will be found in this issue beginning with Page 492.

ANDREW AND PETTIT ARE PROMOTED BY SEIBERLING RUBBER CO.

Wilfred Andrew

Leo Pettit

Seiberling Rubber Co., Akron, Ohio, has announced two important personnel changes in its factory staff. Wilfred Andrew, general production superintendent, has been named factory personnel administrator, while Leo Pettit has been appointed to the post of production superintendent.

Navy Develops New Cement

A new cement, which is a mixture of butadiene-acrylonitrile and vinyl chloride, has been developed by the United States Navy for waterproofing sewed seams in parkas, trousers and jackets. The cement has high resistance to moisture at low temperatures. Three coats of the compound applied to double needle seams were found to withstand water pressure of 148 pounds per square inch at room temperature, and as high as 60 pounds per square inch at —40°F. The cement is reported not to crack at low temperatures and not to be tacky at high temperatures. The solvents in the cement are said to volatilize at room temperature in approximately two hours. Detailed information on the cement and on experiments with other compounds for waterproofing seams is contained in a report (PB-9418) issued by the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

Plastics Show Set for Chicago

The Society of the Plastics Industry has announced that the Second National Plastics Exposition will be held May 5 to 11, 1947, at the Coliseum in Chicago, Ill. Conference headquarters for the exposition, which also serves as the industry's annual convention, will be at the Stevens Hotel. The Chicago exposition is expected to surpass this year's New York exhibition in both display and attendance, though 87,000 persons viewed the modern plastics world at the Grand Central Palace.

F.T.C. Charges Price Fixing

The Federal Trade Commission issued a complaint on July 2 accusing 36 manufacturers or distributors of rubber heels, soles and accessory products of a conspiracy to fix prices. The respondents, also including three trade associations, were given twenty days to answer. The complaint alleges that the respondents conspired to obtain approval by the Office of Price Administration of prices and resale prices "jointly desired and previously agreed upon." The Heel and Sole Division of the Rubber Manufacturers Association and the Rubber Heel and Sole Manufacturers were alleged by F.T.C. to have conspired to establish uniform prices to jobbers and to fix uniform prices both between jobbers and shoe repair men and repair men and customers. Connecticut Leather and Findings Association, Inc., Waterbury, Conn., the third association named, was asserted to have collaborated in the fixing of uniform resale prices.

Steel Flats Are Available

Speed Treat steel, which heretofore has been available only in the form of hot rolled plates and bars, is now being manufactured by W. J. Holliday & Co., Hammond, Ind., in standard sized rolled flats. These flats enable the user to save the cost of torch cutting when a stock of narrow width is needed. The flats are available in 20-foot lengths from one-half inch to 3 inches thick. Among the products which can be made from Speed Treat flats are gasket dies and shallow molds.

FINANCIAL NEWS

Issues Preferred Stock

Rome Cable Corp. has offered to the public 38,535 shares of 4 per cent cumulative convertible preferred stock at $30 a share plus accrued dividends from July 1. The company had previously extended to stockholders the right to purchase 63,275 shares of preferred stock at $30 a share in the ratio of one share of preferred stock for each three shares of common stock held. Each share of preferred stock is convertible into ⅞ths of a share of common stock until July 1, 1951, and into three-quarters of a share of common stock thereafter. Proceeds from the issuance of the shares will be used by the company to augment working capital to make funds available for, among other things, construction of additional facilities, including erection of a new manufacturing building at Rome, N. Y., and acquisition of equipment. With the completion of the financing, the corporation will have outstanding, in addition to the preferred stock, 189,830 shares of $5 par value common stock and $1,125,000 of 2¼ per cent serial notes.

Seiberling Rubber Co.

First Quarter: Net income of $305,510, after provision for depreciation and all other charges, including estimates for Federal income taxes, which is equal to 92c a share on the common stock, and which compares with $156,471 for the same period in 1945. Although net income for the first quarter almost doubled that of the same period of the previous year, the company reported that there was a slight decrease in sales due to production slow-downs resulting primarily from shortages of material.

Firestone Tire & Rubber Co.

Six Months Ended April 30: Net income of $12,845,926, which is equal to $6.09 a share, and which compares with $10,481,806, or $4.88 a share, in the corresponding period of the previous year. The earnings for last year's period are those reported before a provision of $3,500,000 for the reserve of contingencies was deducted. No report of total sales for the six month period was released, but they are understood to be running at the rate of about $400,000,000 for the year.

Pharis Tire & Rubber Co.

Six Months Ended April 30: Net income of $536,721, which is equal to $2.53 a share, and which compares with $141,013, or 66c a share, for the corresponding period of the previous fiscal year. Net sales amounted to $8,946,374, against $6,594,688 for the same period of the previous fiscal year.

General Reports Record Sales

Sales of the General Tire & Rubber Co. for the first six months of the company's 1946 fiscal year have been announced as greater by $5,000,000 than sales in the biggest prewar year. For the six month period ending May 31, the company reported sales in excess of $49,000,000. The biggest prewar year was 1941, when a total of almost $44,000,000 was established. The figures do not include sales of the Yankee Network, wholly-owned General subsidiary, or of the foreign plants, nor do they include fees received for operation of the government-owned synthetic rubber plant at Baytown, Texas. The company expects the second half of the year to bring the sales total well over $100,000,000 for the twelve month period.

U. S. Rubber Refinances

U. S. Rubber Co. has prepaid all its $25,500,000 of 2 per cent serial notes, due 1945-54, which were held by thirty-three banks. To provide for potential cash needs, the company has arranged with the same group of banks another credit of similar size but at a lower interest rate. Under the new plan, interest will be payable from date of issuance at the rate of 1½ per cent annually to June 27, 1951, and thereafter at 1¾ per cent. The notes may be issued at any time up to June 27, 1948. The company has agreed to pay quarterly to each participating bank a fee at the rate of ¼ per cent yearly on the daily average unused amount of its credit commitments.

New Tire Mold Cleaner

Kelite Formula 304, a new tire mold cleaner used by immersion or brush on application has been introduced by Kelite Products, Inc., P. O. Box 2917, Terminal Annex Station, Los Angeles, Calif. According to the company, this new material can be used by large or small operators because while mold cleaning tanks are desirable, they are not completely necessary. It is reported that good but slightly slower results may be obtained by brushing Formula 304 on molds and allowing them to stand for several hours. No wire brushing or scraping is necessary. The mold cleaner is available in 55, 15, 7½ and 1 gallon quantities.

Seeks Agency in Mexico

Maximo Sanchez, Depositos "El Fenix," S. A., Calle de las Cruces 5, Mexico, D. F., is interested in hearing from American manufacturers of rubber products who are seeking sales representation in Mexico.

Four Appointed by Agawam

Agawam Chemicals, Inc., West Springfield, Mass., has appointed three new men to its development and research staff and one to its technical sales department. The new members of the development and research staff include Franklin W. Wilcox, who was associated with the General Latex & Chemical Corp. before entering the service; H. M. DiGiovanni, recently discharged from the Army with the rank of major and who previously received his B.S. degree in chemical engineering from the University of Pittsburgh; and Walter W. Waide, who holds a B.S. degree in chemical engineering from Northeastern University. Franklin B. Comery, formerly a naval pilot who received his B.S. degree in chemistry at Bowdoin College in Maine, is the lone addition to the technical sales department.

WAA Sells Wire and Cable

Four million feet of shipboard electrical insulated wire and cable, originally believed to have no commercial value, has been sold for $672,659 by the War Assets Administration to more than 90 buyers. Designed and manufactured for repair of British naval vessels prior to the entrance of the United States into the war, this cable consisted of 239 individual patterns, including 22 different types ranging from A.W.G. to 1,600,000 circular mils. It was used for light and power circuits, communications, radio, instrument wiring and Degaussing. Insulation consisted of varnished cambric, rubber, synthetic resin and asbestos. Lead sheath, lead and armor and rubber were used as jackets. Unadaptable to standard commercial use, the cable was sold to be adapted to other uses in which safety standards were not involved.

Monsanto Leases Plant

Monsanto Chemical Co. has leased the Chemical Warfare Service plant at Monsanto, Ill., which the company operated for the Army throughout the war. The company expects to spend approximately $1,000,000 on alterations and additions to the plant where an estimated several hundred workers will be employed in the manufacture of products which have been under research study or process development. The lease specifies that Monsanto will keep the plant equipment intact and will ready the plant for wartime operation in case of a national emergency.

To Expand Resin Production

Plans have been completed by the Glenn L. Martin Co. for the construction of several industrial buildings on a ten-acre site near Painesville, Ohio, where the company will manufacture vinyl type synthetic resins. The plant, which will cost approximately $1,500,000, is expected to have the capacity to produce 11,000,000 pounds of synthetic resins a year.

Collier Again Heads ASTM Group

At the Annual Meeting of the American Society for Testing Materials, held at the Statler Hotel in Buffalo, N. Y., the week of June 24, Simon Collier, Staff Manager of the Inspection and Control Department of the Johns-Manville Corporation, was re-elected as chairman of Committee D-11 on Rubber Products. Harry Outcault (St. Joseph Lead) and Arthur Carpenter (Goodrich) were re-elected as vice-chairman and secretary, respectively. Mr. Carpenter was also elected president of the ASTM (as reported elsewhere in this issue). A biography of Mr. Outcault, who was recently promoted to assistant sales manager of the zinc oxide department of the St. Joseph Lead Co., appeared in our previous issue.

Mr. Collier has been associated with the rubber industry for some 30 years. A graduate in chemistry of the Worcester (Mass.) Polytechnic Institute, class of 1916, he was associated with the Boston Belting Co. and the National Bureau of Standards before joining Johns-Manville as chief chemist of the Waukegan, Ill., factory. He was named to his present post in 1937. Mr. Collier has made numerous contributions to the technical literature of the industry. Long an active member of the ASTM, he has served as chairman of various subcommittees of Committee D-11. He was also chairman of the Chicago Rubber Group from 1932 to 1933, and has played an active role in the New York Rubber Group as well.

Chemical Exposition Planned

The Fourth National Chemical Exposition, which has been held every two years since its inception in 1940, is scheduled to run concurrently this year with the Fall Meeting of the American Chemical Society, to be held in Chicago, Ill., from September 9 to 13. The exposition, sponsored by the Chicago Section of the A.C.S., will be held in the Chicago Coliseum from September 10 to 14. Many of the exhibits at the exposition will reflect the results of the war, either in modifications resulting from changes in material resources or innovations brought about by war research and development work.

Hercules Technical Bulletins

Hercules Powder Co., Wilmington, Delaware, has issued the first of a series of bulletins intended to point out the advantages of GR-S-10 over regular GR-S and the advantages of using resin softeners, such as the company's Staybelite Resin, in non-black rubber compounds. GR-S-10 utilizes Hercules Dresinate 731 as the emulsifier in its manufacture by emulsion polymerization. The initial bulletin presents data on four volume loadings of hydrated alumina in softened and unsoftened stocks. A conveniert holder for subsequent bulletins is also furnished.

Semon Receives 20-Year Pin

Dr. Waldo L. Semon, director of pioneering research of the B. F. Goodrich Co., recently completed 20 years of service with that company. Dr. Semon is

credited with the discovery and development of Koroseal, the company's synthetic flexible plastic material, and with Ameripol synthetic rubber. In the above photograph, Dr. Semon (left) is being presented with his 20-year service pin by John L. Collyer, Goodrich president.

Williams Retires from DuPont

Carl S. Williams, chief supervisor of the Rubber Chemicals Laboratory of E. I. du Pont de Nemours & Co., Wilmington, Del., retired from that post on July 1. A native of Cleveland, Ohio, Mr. Williams received his A. B. degree in chemistry from Ohio State University in 1913. Joining the Roessler & Hasslacher Chemical Co. in 1915, he worked on rubber chemicals, particularly accelerators, soon becoming director of the accelerator and rubber service department. Soon after the company was acquired by DuPont in 1930, Mr. Williams was transferred to the Rubber Laboratory in charge of personnel and laboratory operations. He has made many improvements in the science of rubber testing and in the development of natural and synthetic rubber compositions. Mr. Williams resides in Woodbury, N. J.

General Tire Promotes Goldie

General Tire & Rubber Co., Akron, has announced the appointment of J. J. Goldie as director of administration. Mr. Goldie became associated with the company in 1926 as an assistant credit manager, and was made, successively, manager of branch office operations and general office manager. It was also announced that H. L. Mollenkopf, recently discharged from the Army with the rank of major, has been appointed general office manager, and R. W. Henderson, also recently discharged from the Army, has been named manager of branch offices.

Patents Returned by Court

A final decree was entered in Federal court on July 8 directing the Alien Property Custodian to return a substantial portion of the patents and stock seized on May 24, 1944, from the Standard Oil Company of New Jersey and three subsidiaries because of alleged German interests. Under the decree, the company retains title or at least exclusive licensing rights to 70 per cent of the patents, which were part of a $35,000,000 purchase from I. G. Farbenindustrie in 1929 and 1939. While rights to the principal buna rubber patents, which were involved in the litigation, were retained by the Alien Property Custodian, company attorneys pointed out that they had been granted royalty free to all manufacturers by Standard Oil "to expedite the synthetic rubber program." The company contended that no German interests in the patent rights remained after 1939, while the Government maintained that the transfer of patents from the German company was transfer in form only.

Armour Grants Patent Rights

Armour & Co. has issued a license to General Mills, Inc., granting the latter rights under Armour patents to operate a fats and oils chemical plant for the production of fractionated fatty acids from animal, vegetable and marine oils. The fractionating processes will be used at a new chemical plant which General Mills recently announced would be built at Kankakee, Ill. The processes enable the separation into their component parts of mixed fatty acids present in fats and oils. After being separated the fatty acids are converted chemically into new products used in the manufacture of natural and synthetic rubber products, alkyd resins and other protective coatings, soaps and synthetic detergents.

Enters Manufacturing Field

The South Gate Rebuilt Tire Co., 8720 Long Beach Blvd., South Gate, Calif., engaged in tire retreading and recapping since 1932, has recently expanded into the rubber manufacturing field. Employing some 30 people, the firm will now manufacture tire repair materials, camelback, rubber-covered rolls and mechanical rubber specialties. W. G. Baird is owner of the concern and Jack Holland and Charles Bohannon are general manager and factory manager, respectively.

Cellophane Surface Coating

A surface coating consisting of very finely cut particles of cellophane is now being produced by the Rayon Processing Co. of R. I., 100 Tremont St., Central Falls, R. I. The coating, known as Cellophane Spangles, is produced at present only in white. When applied to a surface, it is said to give a distinctive sparkle, due to the reflection of light by the millions of tiny facets.

LOS ANGELES NEWS

A near-record attendance was registered at the June meeting of the Los Angeles Rubber Group on June 4 when William Jeffers, former "rubber czar" and former president of the Union Pacific Railway Company, was the featured speaker. This was the concluding supper meeting of the year and the thought was to have an outstanding man so that the meetings might begin this fall with the old enthusiasm.

Mr. Jeffers' talk was not technical but rather a summary of his experience as director of the rubber program.

He gave due credit to those in chemical research who worked so faithfully in the development of synthetics and credit to his helpers who aided him in working out plans for conservation of existing stocks at the time war was declared.

The general sentiment was that the meetings of the year were all essentially successful. A new record for attendance was established at a meeting during the year and interest in the programs apparently have reached a new height.

There are to be two outings this summer for members of the Los Angeles Rubber Group. Late in July a day's outing has been planned at the Girard Country Club in the San Fernando Valley, while on August 17 the Group will participate in a deep sea fishing excursion out of San Diego harbor. By having two events there will be something for all since all men do not enjoy fishing.

The United Rubber Company, manufacturers of camelback in Los Angeles, suffered a disastrous warehouse fire late in June which destroyed a supply of stock said to be valued at nearly a quarter of a million dollars. Defective wiring was blamed for the inception of the blaze. Another rubber plant fire also occurred recently when flames severely damaged the plant of the Baldwin Tire Company at El Monte.

Clif Lindsey, formerly with the Southwestern Rubber Company, is now with the Union Rubber Company. New owners of this company are Vern Ratclif and a Mr. Richards. Former owners were Dick Bolding and John Mason.

The Foreman's Club dinner, an annual event at Goodyear, held this year in June at Carl's Crenshaw cafe, proved especially successful, with more than 150 in attendance. Ed Ortil, one of the Radio Rogues, was the chief entertainer, giving imitations of movie and screen stars. Ed Cray, retiring president, acted as master of ceremonies.

J. P. McCarty, who has been manager of the retread plant for Goodyear for ten years, has left the employ of the company to go into business for himself. Mr. McCarty was a member of a group of 107 men who came to Los Angeles when the Goodyear factory was opened.

Hugh Hilliard, personnel director for the Goodyear plant in Brazil, was a recent visitor in Los Angeles. Mr. Hilliard went to the Brazil plant in 1939. He was due to sail from New York early in July on the trip back to South America.

Dean Brown, who happens to be the star horseshoe player for Goodyear, has returned from a six months' trip that took him to the various USO spots in the South Pacific.

Ernst Eger, Los Angeles inventor specializing in rubber products, has received a citation for his contribution toward the development of self-sealing gasoline tanks for combat aircraft. The citation came in the form of a letter of commendation from Rear Admiral H. B. Sallada, chief of the Navy's Bureau of Aeronautics, and the citation was personally presented by Rear Admiral E. M. Pace, Jr. Eger maintains his laboratory at the plant of the United States Rubber Company in Los Angeles.

D. C. Maddy, formerly with the Hycar Chemical Company, is now with the Standard Chemical Company.

Edward Royal of H. M. Royal, Inc., Los Angeles, is about to leave for a trip to the Pacific Northwest.

Bill Snyder, of the R. T. Vanderbilt Company, is absent from Los Angeles for the moment on a business trip to the Pacific Northwest.

Activities at the Golden State Rubber Mills, Los Angeles, are still held up by a strike at this writing.

Plastic sheeting, known as U. S. Royalene, is now in production by U. S. Rubber for use in brief cases, ladies handbags, belts, tobacco pouches and billfolds. Reported to be pliable, tough and washable, the sheeting is made without fabric backing or surface finishing coat.

A new technical catalog which includes the latest books on chemistry, physics, engineering, metals and building construction, has been issued by the Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. The catalog gives the date of publication of each book as well as price, number of pages, detailed descriptions and full table of contents.

Russ Hartz

who was recently named factory superintendent of the new plant of A. Schulman, Inc., at Long Beach, California.

New Mold Release Fluid

A new mold release fluid, known as DC Mold Release Fluid Emulsion No. 35, has been made available by the Dow Corning Corp., Midland, Mich., for use as a release agent in the molding of various types of synthetic and natural rubber. The following advantages are claimed for the release fluid by the company: no build-up on the mold surface, thus saving the expense of cleaning and carrying large inventories of molds; elimination of the breaking-in period normally required of new molds; a faster molding cycle because molded products can be removed from the molds before the fluid is completely cooled; and molding rooms are kept clean and free from dust and powders.

Celebrates 100th Anniversary

New York Belting & Packing Co., 1 Market St., Passaic, N. J., (affiliated with the U. S. Rubber Co.,) one of the country's oldest manufacturers of hose, belting and other industrial rubber products, is celebrating this year its 100th anniversary. The organization's first factory was established at Sandy Hook, Conn., in 1846, seven years after rubber was first vulcanized successfully.

Elects New Officers

California Rubber Products, Inc., 130 North Hawthorne Blvd., Hawthorne, Calif., has recently reorganized and has announced the election of the following officers: W. E. Shawger, president; Gaines Hon, vice-president; John W. Hoekstra, secretary; Viola Burger, treasurer; and James F. Daniel, assistant secretary-treasurer.

NEWS IN BRIEF

A synthetic plastic anti-slip coating, known as Flintred, which is applied by trowel over metal, concrete, hard tile and wood floors, has been developed by the Flintkote Co. Flintred is available in red, green and slate blue, ready for application in trowel coats of approximately 1/16 to 1/8 inch thickness.

A potato basket made out of steel wire coated with rubber has been developed by U. S. Rubber to safeguard potatoes against bruising. The basket weighs 3¼ pounds and holds five-eighths of a bushel.

Roxaprene, a new dip finish based on chlorinated rubber for refrigerator compressors and other mechanical parts, which is said to give a durable, corrosion resistant coating that air dries to permit assembly in 20 minutes, has been developed by Roxalin Flexible Finishes, Inc., Elizabeth, N. J.

A plastic pump, with practically no metal construction, has been introduced by the Pharis Tire & Rubber Co., Newark, Ohio, as a bicycle accessory. The pump can be purchased in combination with a pair of handle bar grips, in colors matching or contrasting those of the bike.

U. S. Rubber has resumed large-scale production of rubber bathing caps, solid white in color with various surface designs. It is expected that there will be sufficient production of these caps to meet about 50 per cent of this year's demand.

The control of hazards resulting from the industrial use of formaldehyde is outlined in the third of a series of pamphlets being issued by the Division of Labor Standards of the United States Department of Labor, Washington 25, D. C., under the general title of "Controlling Chemical Hazards." The other two pamphlets issued so far in the series are on chlorine and ammonia, respectively.

A complete line of attachable-detachable, two-piece safety-seal couplings, which make it possible to hand-assemble flexible hose lines, has been developed by Resistoflex Corp., Belleville, N. J.

The top award for 1945 in the annual advertising competition of Associated Business Papers, an organization embracing leading American business and trade publications, went to the B. F. Goodrich Co. for three representative ads in its industrial products development campaign.

Mine Safety Appliances Co., Pittsburgh 8, Penna., has developed a new type of oxygen mask for fire fighting and industrial use. Called the Demand-Type Oxygen Mask, it is said to feature simplicity with ease of operation.

A new bulletin which discusses the function of a micro-analytical laboratory has been made available by Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, N. Y.

Koroseal beverage tubing, through which the flow of beverages is plainly visible, is again being produced in large quantities by Goodrich.

New rubber floor mats, made with GR-S, in black, maroon, red, white, blue, green, yellow and salmon colors, have been developed by U. S. Rubber for use in theatres, hotel lobbies, office buildings, elevators and apartment houses.

"Carbon Black in War and Peace," an article which appeared in a recent issue of *Chemical and Engineering News*, has been reprinted and made available in booklet form by the Witco Chemical Co., 295 Madison Ave., New York 17, N. Y.

Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, N. Y., has developed a new type of insulating board, called Foamboard, whose principal raw material is glue. The new product weighs one to three pounds per cubic foot and ranks high among commercial heat insulations.

A technical report on Neoprene Refrigerator Door Gaskets, including a recommended formula, has been made available by the Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

A folder describing various coated Fiberglas cloths, and suggesting numerous civilian applications, has been issued by the Owens-Corning Fiberglas Corp., Toledo 1, Ohio. Sample swatches of some cloths are attached.

Wire-backed brake lining is now in production at the Newcastle, Indiana, plant of the Firestone Industrial Products Co. Special type extrusion machines are used.

The New York sales office of Sharples Chemicals, Inc., has been moved to larger quarters in Room 8211 of the Empire State Building, 350 Fifth Ave., New York 1, N. Y. The telephone number at the new location is BRyant 9-3360.

Paraplex G-40 Plasticizer

A new plasticizer, which is of special interest to compounders of polyvinyl chloride and synthetic rubber stocks, has been developed by the Resinous Products & Chemical Co., Philadelphia, Penna. Known as Paraplex G-40, the new plasticizer is described as an improvement over the company's Paraplex G-25. While both plasticizers are reported to have resistance to extreme heat, to oil and to ultra-violet and weathering, combined with good low temperature flexibility, Paraplex G-40 is said to show improved solvent resistance, appreciably lighter color, lower viscosity at lower temperatures, but slightly poorer low temperature flexibility. Paraplex G-40 is particularly recommended for compounding specialty stocks such as those used for coated fabrics, unsupported sheeting, electrical jackets, adhesives and oil and heat resistant gasket stocks.

Goodyear Promotes Patterson

Ian D. Patterson, who was assigned to military products engineering and tire process development work by the Goodyear Tire & Rubber Co. during the war, has been appointed to the newly-created post of assistant manager of the company's chemical product development division. Mr. Patterson holds an A.B. from Albion College in Michigan and a B.S. in chemical engineering from the University of Michigan. He started with Goodyear in 1921 as a chemical engineer and tire compounder. From 1927 to 1936 he was chief chemist and development manager for the Goodyear plant at Wolverhampton, England. Returning to the United States in 1939, he was superintendent for three years at Goodyear's Pliofilm and molded rubber goods plant at St. Mary's, Ohio.

Polson Rubber Elects Officers

Polson Rubber Co., Garrettsville, Ohio, has announced the election of the following officers: W. J. Frisby as executive vice-president; Fred H. Blum, treasurer; and J. W. McConnell, secretary. H. B. Polson has been re-elected as president of the concern.

Griptread, a non-slip safety flooring and protective covering material for metal, wood and concrete, has been converted to peacetime commercial uses by Goodyear.

A new industrial wheel, constructed with a metal bearing sleeve molded integrally in a hard rubber core in which ball bearings for a choice of axle diameters are mounted, is now being produced by Goodrich.

Goodyear Sundries & Mechanical Co., Inc., has announced the organization of the Goodyear Rubber Export Co. at 55 Broadway, New York 6, N. Y., to succeed its export department.

OBITUARIES

John C. Treadwell

John C. Treadwell, formerly vice-president and general manager of the Intercontinental Rubber Co., died at the home of his daughter in Green Farms, Conn., on July 13. He was 77 years old. Born in Ashtabula, Ohio, Mr. Treadwell was graduated from the University of Texas. He managed various gold and silver mines in Chihuahua, Mexico, before joining the Intercontinental Rubber Co. in Coahuila, Mexico, in 1906. With the company, he followed a long career as rubber chemist and planter, chiefly in Mexico and Sumatra. From 1923 to 1926, he was a member of the Crude Rubber Survey in Northern Tropical America for the Department of Commerce. A widow and two daughters survive.

H. Newton Walker

H. Newton Walker, executive vice-president of Walker Brothers, Conshohocken, Penna., died at his home in Short Hills, N. J., on July 8 at the age of 64. Born in Newton, Kan., Mr. Walker was educated in Philadelphia, Penna. He became associated at an early age with the Walker Electric Co., founded by his father, and in 1912 helped to organize the Conshohocken concern. He was a member of the board of trustees of the Overlook Hospital in Summit, N. J., a vestryman of Christ Church in Short Hills, N. J., and a member of the Union League Club in New York City. He also was a director of the United States Pipe & Foundry Co. A widow and son survive.

Fred O. Williams

Fred O. Williams, who served as president of the Seamless Rubber Co., New Haven, Conn., from 1917 to 1932, died at his home in Kent, Conn., on June 16. Before joining Seamless, Mr. Williams was associated with the Faultless Rubber Co., Ashland, Ohio, for several years as sales manager. Burial was made in Louisiana, Missouri. A widow survives.

Edward J. Garrigan

Edward James Garrigan, vice-president in charge of sales and a director of the Okonite Co., Passaic, N. J., died after an illness of several months at his home in Rutherford, N. J., on July 4. He was 62 years old. Born in New York City and educated in the public schools and at Pratt Institute in Brooklyn, N. Y., Mr. Garrison joined Okonite in 1925, was made a vice-president in 1937 and a director in 1943. Before entering the employ of the Okonite firm, he had been associated with the Bell Telephone Laboratories, the General Electric Co. and the Habirshaw Cable & Wire Corp. He was a member of the National Electric Manufacturers Association and other trade groups. A son survives.

Herman E. Smith, Sr.

Herman E. Smith, Sr., who retired in 1924 as vice-president of the U. S. Rubber Export Co., died in New York City on June 22 at the age of 68. Born in Addison, Vermont, Mr. Smith was graduated from the University of Vermont in 1899. A widow and two sons survive.

Parador E in Balata

Resin-containing balata, because of its waterproofing and acid-proofing qualities, finds wide use for cloth for paddings, linings and rug backings, while deresinized balata makes excellent golf ball covers. These two types of balata, whose odor has hindered their sale, according to Givaudan-Delawanna, Inc., New York City, are transformed into almost inodorous materials by the use of the company's Parador E. A small amount of this material can be added during the usual mixing operation.

Winners in Safety Contest

The Hercules Powder Co., Wilmington, Del., and the B. F. Goodrich Chemical Co., Cleveland, Ohio, have been announced as winners in the 1945 safety contest, conducted by the Plastic Materials Manufacturers Association. Both companies had perfect safety records with no lost-time accidents during the year, but the Hercules plastic plant in Parlin, N. J., placed first for having a greater number of man-hours worked than the Goodrich Chemical plant in Niagara Falls, N. Y.

Mansfield Clears Flood Debris

Mansfield Tire & Rubber Co., Mansfield, Ohio, has resumed its normal production schedule after clearing debris from several departments of its plants flooded by a cloudburst on June 12. The flood, worst to hit the company since 1913, paralyzed operations in the major portion of the Banbury mixing and mill rooms of the main plant and crippled operations at Plant No. 2 on West Sixth St., forcing sharp curtailment in production.

Manhattan Has First Strike

A one-day strike at the plant of the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., in Passaic, N. J., was ended on July 11, when members of the independent plant union voted to end a stoppage. It was the concern's first general strike in its fifty-three years of operation. The strike affected 3,700 workers, including 3,200 union members and 500 non-members barred by pickets. It was called in protest to the disciplinary layoff of a veteran who had admitted being absent from work for an hour and a half, although his work card showed he was on the job. The union felt he merely should have been warned. The union voted to return to work when a Federal arbitrator said the Government would not consider the case until the men returned.

Nuplamold for Flexible Molds

Nuplamold has been developed by the New Plastics Corp., Hollywood 38, Calif., for the making of flexible molds suitable for casting of complex shapes and forms. Although tough and rubbery at room temperature, the material becomes liquid at 300° F. and is easily poured to form any desired mold. The material is said to be resistant to water, alcohol, acids and heat, characteristics that permit the baking of phenolic casting resins and the pouring of hot waxes and low melting alloys into the mold. When cooled, reproductions can be cast from such materials as liquid phenolic and urea casting resins, hot waxes, soaps and other materials.

Automatic Devices for Mixers

Two automatic devices, one known as the Loss-in-Weight Control and the other as the Adjust-O-Feeder Motor Driven Metering Pump, for charging Banbury or other mixers with either dry or liquid ingredients, are now being manufactured by %Proportioneers, Inc.,%, 66 Codding St., Providence 1, R. I. The company reports that these devices can automatically add any number of ingredients for compounding in any desired sequence and at any predetermined interval. This equipment is also said to repeat deliveries for each new batch, so that each batch will exactly duplicate the previous one.

To Produce Dies and Molds

The Lester-Aetna Tool & Die Co. is the name of a recently organized concern at Warren, Ohio, which is engaged in the production of die casting dies and plastic molds. Officers of the new firm, which is jointly owned by the Lester Engineering Co., Cleveland, Ohio, and the Aetna-Standard Engineering Co., Warren, Ohio, are Nathan Lester, president; H. Gerald Coffey and D. White, vice-presidents; and Lloyd L. Dalbey, secretary-treasurer.

CANADIAN NEWS

A series of strikes for higher wages, affecting more than 11,000 workers in thirteen plants of ten rubber companies in Ontario, was started by the United Rubber, Cork, Linoleum & Plastic Workers of America (CIO) on June 24. The union has insisted on negotiating on an industry-wide basis rather than on an individual plant basis.

Plants at which strikes have occurred are as follows: the Oakville plant of Barringham Rubber; the Montreal and two Kitchener plants of Dominion Rubber; the Kitchener plant of Goodrich; the Hamilton plant of Firestone; the Bowmanville and New Toronto plants of Goodyear; the Kitchener plant of Kaufman Rubber; and the Toronto plants of Gutta Percha Rubber, Seiberling Rubber, Dunlop Tire and Viceroy Manufacturing Co.

After a study of the issues involved in the labor dispute, Judge J. C. A. Cameron, industrial disputes commissioner, issued a report containing suggestions for the basis of future negotiations. He recommended that negotiations be reopened on an individual plant basis. Other main points in his proposals were wage increases of 8c an hour, introduction of a 44-hour week and payment of a premium of 5c an hour to workers on night shifts. The union sought a 20c increase, 40-hour week and a 10c differential.

Taking the union to task for its stand on industry-wide negotiations, the commissioner declared in his report that wide variations in the working conditions of the plants involved, the areas in which they were located and the nature of their production made blanket recommendations unsuitable. He noted that the U. S. Wage Stabilization Board had refused to approve industry-wide patterns for the rubber industry in that country.

On the other hand, Judge Cameron thought that some of the companies have not approached the negotiations in a realistic manner, since the union's program was presented to the companies as a basis for local negotiations more than six months ago and in a number of cases concrete counter-proposals were never made by management.

Viceroy Manufacturing Co. has reported a net profit for the year ended February 28, 1946, of $82,472, which is equal to 62c a share, and which compares with $50,328, or 38c a share, for the previous fiscal year. The consolidated balance sheet as of February 28, 1946, indicates current assets of $655,405, as compared with $723,308 for the end of the previous fiscal year, while current liabilities are reported at $267,331.

According to the company, the bond mortgage was reduced by $30,000 to $372,000 during the year and 1,128 preferred shares were redeemed. The company also purchased all the land, buildings, machinery and equipment previously held under lease, completed construction of additional buildings at London, Ont., and installed considerable new equipment in its London and Toronto plants.

Plans for a $2,000,000 program of plant expansion have been completed by Canadian Goodyear to provide facilities for the manufacture of two of its products—Airfoam and Pliofilm. The program will include the erection of two new buildings, each two stories high, joined by a connecting bridge, north and west of the main Goodyear plant at New Toronto. Total floor area, including the bridge, will be 85,000 square feet. Approximately 150 new employees are expected to staff the new plant, which is scheduled to start producing at capacity early in 1947.

At a special meeting, held on June 30 in Montreal, stockholders of the Goodyear Tire & Rubber Company of Canada approved refunding of all 5 per cent $50 par preferred shares with a 4 per cent $50 par preferred issue. Under the plan the 40,000 shares of 5 per cent $50 par preferred unissued will be reclassified as 40,000 shares 4 per cent $50 par preferred, and there will be created an additional 120,000 shares of new 4 per cent preferred.

A part of the new preferred shares will be issued to replace the outstanding 109,162 shares of 5 per cent preferred. The new issue will be 4 per cent cumulative redeemable sinking fund preference shares.

Dominion Rubber Co. has announced several new appointments in its tire division at Kitchener, Ont. R. D. Ratz, who has served as technical superintendent, plant superintendent and factory manager of the division, has been named production manager, while J. W. Symons, formerly sales manager of the division, has been appointed factory manager. Other appointments include: J. A. Lucas as general sales manager and G. P. Davis as divisional sales manager.

Richard C. Berkinshaw, general manager and treasurer of the Goodyear Tire & Rubber Company of Canada, has been awarded the CBE (Commander of the Civil Division of the Most Excellent Order of the British Empire) by the British Government.

William W. West, widely known in weaving and textile circles in both the United States and Canada, was recently elected president of the Donahue Corporation of Canada, manufacturers of narrow fabrics and elastic products. Mr. West is also treasurer and managing director of Bridgeport Fabrics of Canada, Ltd. Other officers elected were: H. B. Naramore, first vice-president; A. J. Donahue, Jr., second vice-president; B. H. Welch, secretary; and Kenneth Anderson, treasurer.

J. Ross Belton

general manager of the Gutta Percha & Rubber Co., who was recently elected a director the company.

Hon. C. D. Howe, Minister of Reconstruction, announced in Ottawa on July 9 that the Government-owned synthetic rubber plant at Sarnia, Ont., now is producing 100,000 pounds of synthetic rubber annually—18 per cent more than its designed capacity. Although the plant a year ago was producing only one type of Buna S rubber, it is now turning out four types, plus three types of Buna S latex.

Johns-Manville Company of Canada, Ltd., has acquired a site for a new factory at Port Union, Ontario, about 17 miles east of Toronto. Although building plans are incomplete, it is expected that construction of the new plant will be started as soon as materials and labor are available and titles to the properties involved have been cleared.

J. Ross Belton, general manager of the Gutta Percha & Rubber Co., Ltd., Toronto, has been elected a director of the company.

For the fourth successive year, the St. Jerome, Quebec, plant of the Dominion Rubber Co., Ltd., has been awarded the annual safety trophy in that company's inter-plant accident prevention campaign to reduce disabling injuries. C. W. Hadgcraft is factory manager of the St. Jerome plant.

NEW RUBBER GOODS

Rubber Specialties for Dogs

Chocolate flavored rubber bones and rubber doughnuts as dogs' playthings have been introduced by the Ideal Rubber

Co., 200 Fifth Ave., New York 10, N. Y. Colored green and red, the bones and

doughnuts are packed twelve to a box, weighing approximately one and three-quarter pounds.

Neoprene-Treated Mattress-Bed

An inflated mattress-bed in which the underside of the fabric is coated and impregnated with neoprene is being manufactured by the New York Rubber Corp., 350 Fifth Ave., New York 1, N. Y. The couch-size bed, which weighs about eleven pounds, is blown up with a vacuum cleaner, by mouth or by hand-pump. Mattress and pillow, made in one piece, are inflated separately, so each section may be adjusted for individual desires.. Available in a combination of green and tan, the bed is 80 inches long and 32 inches wide. When inflated, the mattress section is 5 inches thick and the pillow 10 inches.

Plug Stops Tank Leaks

A new device, called Perma-plug, has been developed by the Perma-Line Rubber Products Corp., 1840 North Damen Ave., Chicago 47, Ill., for stopping tank leaks. The flange part which fits on the inside of tank is rubber covered and when leaks occur a hole is drilled through the tank and the Perma-plug is inserted from the inside and held in place by the

stud which goes through the wall of the tank and is fastened by a lock washer and nut on the outside. The covering for the plug may be neoprene, vinylite or natural rubber, depending upon the purpose for which the plug is to be used. The entire metal assembly is cadmium plated before the coat is applied. Plugs are now being made in stock sizes of 2-inch, 4-inch and 6-inch, but special sizes and shapes can be made to order.

Coolapak Refrigerator Bag

A portable refrigerator bag which is reported to keep food fresh from 12 to 24 hours, using ice cubes or dry ice, has been introduced by the Hodgman Rubber Co., Framingham, Mass. Known as the

Coolapak, the bag is said to be thoroughly airproof and waterproof. It consists of an outer coated fabric, an inner bag of rubberized coating, and an insulating bag between them.

Outdoor Wading Pool

A new type of outdoor wading pool for children has been introduced by the U. S. Rubber Co. Made of heavy duck fabric coated on both sides in color with

synthetic rubber, the wading pool is 68 inches in diameter and 15 inches in height. The pool is not only said to be completely watertight but also sun proof, rot proof, acid proof and highly resistant to abrasion and puncturing. Since the wading pool is collapsible, it can be transported from place to place.

Inflatable Rubber Boat

An inflatable rubber boat, especially designed for civilian use, is now in production by the U. S. Rubber Co. The new type boat, which is eight feet, four

inches long and four feet, two inches wide, is made of heavy duck, coated on both sides with a synthetic rubber which is impervious to gasoline and resistant to sunlight, aging and abrasion. Two rigid seats are properly located for rowing. A motor bracket is also available as an accessory which enables the boat to be used with an outboard motor. In its carrying case, the inflatable boat and equipment weigh 37 pounds.

Non-Slip Rug Underlay

A new type of underlay that will anchor scatter rugs and runners securely to highly polished floors has been introduced by the U. S. Rubber Co. The protective underlay, known as U. S. Non-Slip, is a sponge rubber cushion reinforced internally with a strong fabric. It is being produced in 24 inch, 32 inch and 54 inch widths that can be cut to fit any size rug or runner.

LATEX & Its Industrial Applications (Vol. I)
LATEX & RUBBER DERIVATIVES (Vols. II & III)
& Their Industrial Applications.

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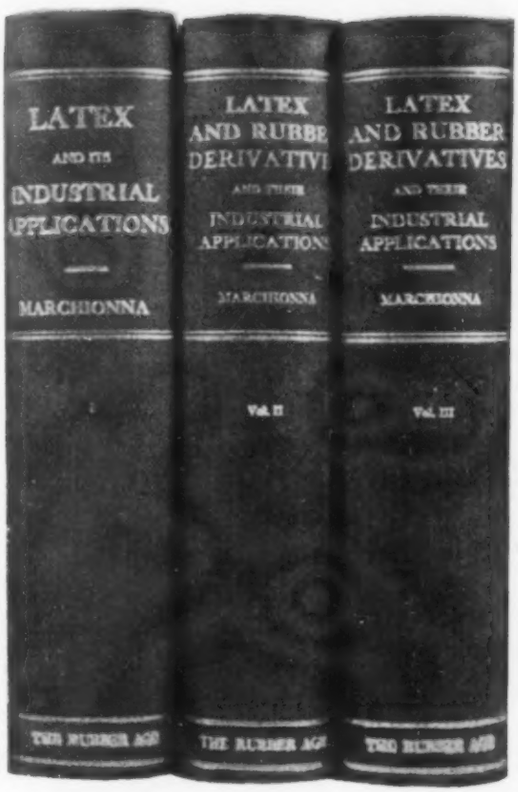
By FREDERICK MARCHIONNA



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NEW EQUIPMENT

Lawson Continuous Rubber Thread Tester

A new type of continuous rubber thread tester which is not intended to replace present methods of making static tests but to ascertain in advance whether rubber thread will run through a knitting or braiding machine at a desired stretch without breaking has been developed and is being offered to industry by Lawson Products, Inc., 486 Pawtucket Ave., Pawtucket, R. I.

Front view of Lawson Tester.

According to Lawson engineers, static tests are determined on sample specimens only and do not indicate the capacity of the whole thread, in addition to which rubber thread that stands a 950% stretch during a static test often may not be safely run through the knitting or braiding machines at 450% stretch. The new tester, front and rear views of which are shown herewith, is designed to overcome these testing deficiencies.

Operation of the Lawson Tester is simple. The two revolving multiple spindles shown in the front view

Rear view of tester.

revolve at a given ratio of speed to give the desired stretch. By changing the lower gear shown in the rear view any required stretch from 0 to 950% may be obtained. The rubber thread is wound several times around the left hand spindle on the front of the machine and then around the right hand spindle and the machine

set in motion. The thread is fed to the left hand spindle from a spool (upward arrow) and may be handled in various ways as it leaves the right hand spindle (downward arrow). For instance, it can be run off into a container and later respooled; or, in the case of use by rubber thread manufacturers, it can be run off on to the floor; or, if desired, means can be supplied to rewind it temporarily on a spool. The manufacturer suggests that the first method, i.e., running the thread off into a container and respooling it later, be followed, since the set developed during the test should have some time to clear before respooling.

Tension and uniformity of the rubber thread during the test is read from a scale. In the event of a break the tester stops instantly. If a satisfactory test has been obtained the rubber may be used in normal fabrication and if it is not satisfactory for the required stretch then it may be used in manufacture where less stretch is required. A recording device can be furnished with the Lawson Tester so that a permanent record of tests may be maintained.

A new self-sealing, air-operating, ball type valve, known as the **Type BA Valve,** has been developed by the Leslie Co., Lyndhurst, N. J. Fitted with a hand opening lever and a rotatable pivot so that the lever can be located in any position, the valve can be opened instantly from almost any position with either a horizontal or vertical pull.

Wheelco Instruments Co., 847 W. Harrison St., Chicago, Ill., has announced the availability of the **Wheelco Multronic Capacitrol,** a multi-position electronic pyrometer controller. It provides conventional on-off control at one or two different points or control of two separate fuel systems on a single pot or other heat-treating type furnace.

A new **Delmhorst Moisture Detector** for use with materials in sheet form is available from the Colloid Equipment Co., Inc., 50 Church St., New York 7, N. Y. It will make determinations with close accuracy of moisture contents ranging between 3 and 15%, depending upon the material tested.

FOR EASY PROCESSING USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 376

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A specific industrial and market survey will be prepared at your request. Write us and outline your needs. Correspondence will be strictly confidential.

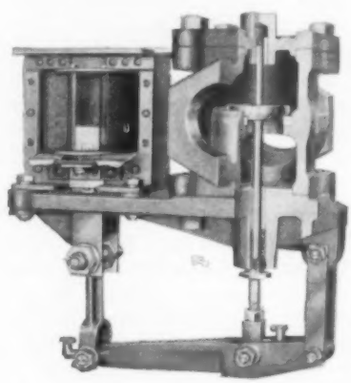
Dept. C., Industrial Division,
Chamber of Commerce,

Jacksonville
FLORIDA

Direct-Acting Solenoid Valve

A direct-acting solenoid valve for high differential pressures, which combines immediate full flow with the ability to operate under differential pressures as high as 150 pounds, has been introduced by the Johnson Corporation, Three Rivers, Michigan. It can be used for all types of liquid level control, with hot and cold water, steam, oil and other processing liquids.

This new Johnson Valve is direct-acting—not pilot operated. The solenoid is conservatively rated and an ingenious lever arrangement provides ample power to insure positive opening of the valve. This single seat construction, the manufacturer points out, eliminates the trouble sometimes encountered with pilot operated valves when silt or other foreign matter freezes the piston. It also greatly increases the temperature range—enables the new valve to handle hot liquids or steam up to 365°F. In normal position the valve



Cut-away view of the Johnson direct-acting solenoid valve.

is closed; when solenoid is energized the valve opens instantly to full capacity. There is no time lag or delay, and no wire drawing of valve or seat that often results when valves open and close slowly.

Some of the uses of the new Johnson Valve in industrial plants include control of make-up water for boiler feeding, water cooling lines to air and ammonia compressors and to plastic molding presses. On steam lines it can be used with temperature-controlled steam water heaters, heat exchangers and similar equipment. It can also be used to control the supply of steam to processing, plating and cooking equipment of various kinds, and for remote thermostatic control in heating systems. The valve is designated as a globe screwed type, and is designed and built for heavy duty service. Body of the valve is of cast iron or bronze, tested for 150 lbs. pressure, with top cap and bottom section bolted to body. Valve, seat and valve stem are all of stainless steel.

The Johnson Valve is available in two series. Type HH, sizes from ½ inch to 1½ inch, is suitable for differential pressures ranging from 125 to 150 lbs.; Type HL, sizes 1 inch to 3 inches, is for medium and low differential pressures. Standard models are furnished for operation on 110, 220, or 440 volt 60 cycle current.

Patents Available for License

(Continued from page 451)

Miscellaneous

2083201	18-61	Process for the production of patterned rubber slates for covering walls, floors and ceilings
1903038	91-67.8	Felt rubber roller
1963226	96-26	Rubber cord
1781370	154-2	Process for manufacturing raw-caoutchouc plates
1912807	154-2	Process for the manufacture of structures wholly made of rubber
2002527	154-2	Method of securing a preformed and continuous sheet of unvulcanized rubber to a portion of a fabric upper
1915882	154-40	Process for attachment of rubber plates to leather or the like
1774858	154-42	Method of uniting laminated materials
1816472	154-42	Hollow inflatable sheet rubber bodies and process of producing same
1825308	154-42	Inflatable hollow rubber body
1869550	154-42	Pressing and cutting template for the production of articles composed of crude rubber sheets
1909746	154-43	Rubber coated articles
1885810	204-182	Process for the separation of electrically charged particles from fluids with the aid of an electric current
1885831	204-182	Process for the separation of rubber
1792903	248-362	Mortar for dental purpose
2278943	260-3	Process for the production of rubber like binding agents for fiber substances
2206883	260-613	Aromatic-Aliphatic acetals
1981722	260-722	Manufacture and production of porous rubber (erasers)
1745657	260-723	Rubber substance and process of making same (batteries)

FOR HIGH TENSILE USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 376

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They are compact—they do not have metal seals—the body is made of cast bronze and steel parts are made of stainless steel—they will not corrode.

They are made in five sizes—¼, ⅜, ½, ¾ and 1 inch—and in two-way, three-way, and four-way types. They can be furnished in eight or more different designs—knob, lever, foot, cam, clevis, single diaphragm, double diaphragm or solenoid operated.

They will control air efficiently up to 200 lbs. pressure with a very light movement. The area through the valves is equivalent to pipe size with minimum pressure drop. Write for literature.

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REVIEWS

BOOKS

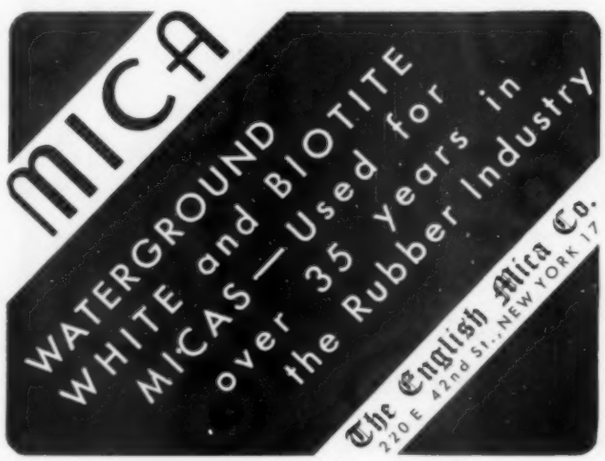
The Electron Microscope (Second Edition). By E. F. Burton and W. H. Kohl. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 325 pp. $5.00.

Prepared at the suggestion of the publishers, this second edition of "The Electron Microscope" has been considerably revised and enlarged, and of course brought completely up to date. The text has been rearranged and revised in many places to attain greater coherence in the presentation of the subject matter. Some material has been eliminated as being of too specialized a character for the scope of the book which is now subtitled "An Introduction to Fundamental Principles and Applications." The chapter on the history of the electron microscope has been eliminated and part of its content incorporated in other chapters; the chapters on electron optics have been enlarged and the material on electron lenses consolidated therein; the chapter on the compound magnetic electron microscope has been re-written completely and much new material added, and the chapter on the applications of the electron microscope has been largely re-written. The bibliography on electron microscopy has of course been expanded. In all, the revised edition has 21 chapters, and is complete with author and subject indexes. (For a review of the first edition see RUBBER AGE, Oct., 1944, p. 90.)

•

Petroleum Production. Vol. I. Mechanics of Production: Oil, Condensate, Natural Gas. By Park J. Jones. Published by Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 228 pp. $4.50.

This book sets out for consideration a system of mechanics of producing oil and condensate prior to the breakthrough of displacing fluids into producing wells. The author sets out to prove that higher oil and condensate recoveries are achieved by producing as much oil and condensate as possible prior to the breakthrough of displacing fluids and that the cost per barrel of production is least when maximum recoveries are achieved prior to the breakthrough of water or gas into producing wells. Physical facts are expressed in terms of the units and terminology used by field personnel. The book has 15 chapters in all, and author and subject indexes.



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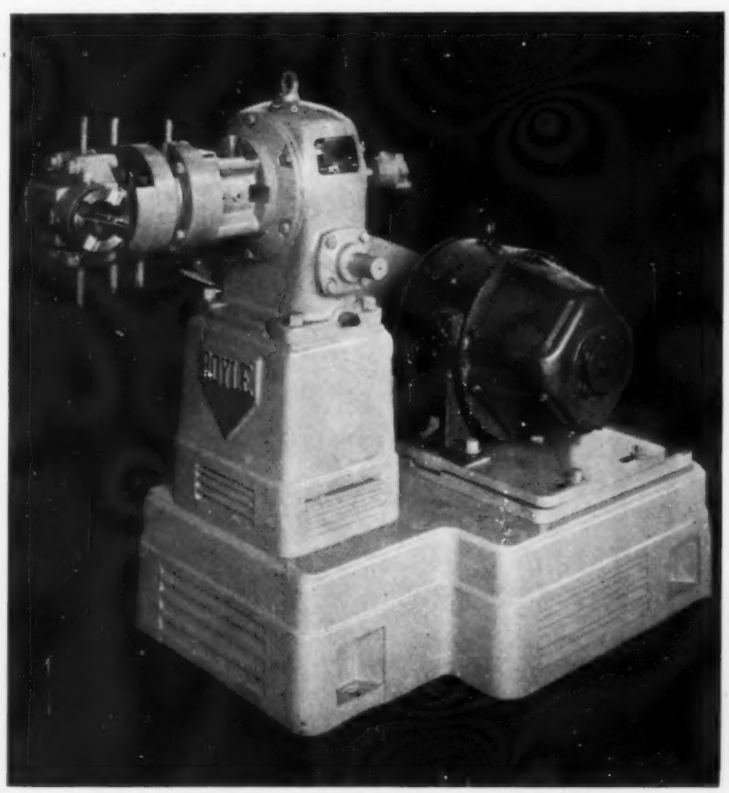

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REVIEWS (CONT'D)

Physical Methods of Organic Chemistry. Vol. II. Edited by Arnold Weissberger. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 6 x 9 in. 640 pp. $8.50.

This is the second volume in a serious of two volumes of a work designed to bring together the numerous physical methods which are often applied by chemists to problems involving organic chemistry. Like the first volume (reviewed in RUBBER AGE, February, 1946, p. 634) it is composed of a number of contributions on the subject from experts in the field. It contains 10 chapters, and includes a subject index covering both volumes. Titles and authors of the chapters follow: *Spectroscopy and Spectrophotometry,* W. West; *Colorimetry, Photometric Analysis, and Fluorimetry,* W. West; *Polarimetry,* W. Heller; *Determination of Dipole Moments,* C. P. Smyth; *Conductometry,* Theodore Shedlovsky; *Potentiometry, L. Michaels; Polarography,* Otto H. Muller; *Determination of Magnetic Susceptibility,* L. Michaels; *Determination of Radioactivity,* W. F. Bale and J. F. Bonner, Jr.; *Mass Spectrometry,* David W. Stewart.

BOOKLETS, CATALOGS, etc.

Witco Stearates. (Bulletin No. 46-1). Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 28 pp.

The physical properties of the more commonly used stearates produced by the company are presented and the applications of these stearates in various fields, including rubber, plastics, paints, inks and oils, are described in this technical bulletin. Among the stearates covered are aluminum, barium, calcium, lead, magnesium, sodium and zinc. Data showing the effect of stearates on the viscosity and other properties of lubricating oils, paint vehicles and greases is also included.

•

Air Control Valves. Valvair Corp., Akron, Ohio. 8¾ x 11¼ in. 102 pp.

Approximately 120 excellent photographs are utilized in this catalog to illustrate the complete line of air control valves manufactured by the company. Divided into seven main sections, the catalog covers the numerous types of two, three and four-way valves which are operated by knob, lever, clevis, cam, foot, single diaphragm and double diaphragm. Dimension charts are included for each type of valve. In addition, a special section is devoted to photographs and prices of various valve parts.

FOR GOOD ABRASION RESISTANCE USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 376

A REVOLUTIONARY MACHINE For INJECTION MOLDING OF RUBBER

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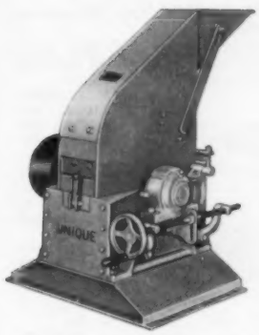

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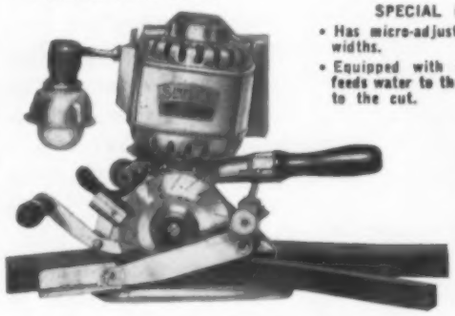

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REVIEWS (CONT'D)

Koroseal—The Modern Flexible Material for Industry. B. F. Goodrich Co., Akron, Ohio. 8½ x 11 in. 20 pp.

Following a short history of the development of Koroseal, the company's polyvinyl chloride plastic, this booklet outlines its resistance to destructive elements, including corrosives, oils and solvents, flame, water, moisture, heat and aging, sunlight and oxidation. The physical properties of Koroseal are comprehensively discussed, including weight, volume, stability, contamination and toxicity, odor and taste, and color. Various forms in which the material is available, including sheets, molded articles, tape, gels, solutions, extruded forms and coated goods are discussed. Numerous industrial applications of the product in all its forms are graphically pictured and described, with a section devoted to consumer uses of the material.

•

Suspend It on Rubber. B. F. Goodrich Co., Akron, Ohio. 8¼ x 10¾ in. 20 pp.

A description of the construction and applications of the company's Torsilastic rubber spring is contained in this booklet. The development of the spring and its application in buses and military vehicles such as "water buffaloes," "alligators" and landing barges are first described and illustrated, and then the technical story of its construction is presented. In addition to the use of the spring in automobiles, tanks and buses, the booklet lists numerous other items, including office chairs, furniture, farm implements and porch swings, in which it can serve as a suspension member.

•

Leadolene. Brooks Oil Co., 315 East Carson St., Pittsburgh 19, Penna. 8½ x 11 in. 12 pp.

The company's lubricant developed to meet the requirements of new production methods which use increased speeds and high heat conditions is described in this booklet. The qualities of Leadolene as an industrial lubricant are presented, including film strength, adhesiveness, stability and low temperature factors. A section of the bulletin illustrates the lubricant's successful use for screwdowns, mill tables, mill pinions, circulating oil systems, hydraulic systems, open and enclosed gears, flexible couplings and worm drives.

•

H-P-M Turbojector. (Bulletin No. 4601). Hydraulic Press Mfg. Co., Mount Gilead, Ohio. 7¾ x 10½ in. 8 pp.

The operating and production features of the Turbojector, a new rubber injection molding machine, are described in this bulletin. The operating features are outlined both in the text and by means of diagrammatic sketches. Complete specifications of the new molding unit, which utilizes a "revolutionary" principle, are given, while photographs of some typical moldings are reproduced, with cure times indicated.

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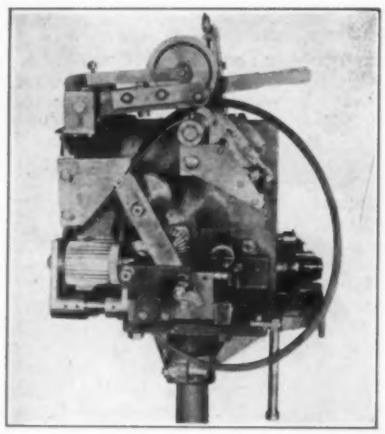

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JULY 15, 1946

Natural Rubber

IMPORTING circles were considerably heartened in recent weeks with the announcement that the Rubber Development Corp. has established a procedure under which importers and importing manufacturers desiring to do so may sell natural rubber to that government agency within the framework of the new agreements negotiated with the United Kingdom, the Netherlands and France. (Details concerning this procedure appear elsewhere in this issue.)

There is also a good deal of optimism in the air concerning the return of a free rubber market in the near future. The view is expounded that before the year is ended the rate of rubber production will be far in excess of probable world needs, outside of the United States. Consumption of rubber in continental Europe for the balance of the year is expected to be below the pre-war rate, while reserve stocks in England are believed to be far in excess of a full year's requirement, not adding the probable imports for the balance of the current year. It is also emphasized that shipments from the Far East are beginning to pick up considerably.

The end of rubber-procuring activities in South America was presaged recently with the announcement that offices of the Rubber Development Corporation at Rio de Janeiro and at Manaos at the Upper Amazon have been closed and that the main office at Belem will be closed shortly. A good deal of the equipment used by Rubber Development in Brazil was sold to the Brazilian Rubber Credit Bank. Additional equipment will probably be disposed of in the same manner when full withdrawal is accomplished.

Prices shown below are those established by the Office of Rubber Reserve, Reconstruction Finance Corporation:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X...	22½	40
Thick Pale Latex Crepe, 1X..	22½	40
Thin Pale Latex Crepe, 1X..	22½	40
Thick Brown Crepe, 1X.....	21⅜	38⅞
Thin Brown Crepe, 1X.....	21⅜	38⅞
Thick Remilled Blankets, #1..	21⅜	38⅞
Rolled Brown or Flat Bark..	18	35½
Smoked Blankets, #1.....	21⅜	38⅞
Claro Brand 1XRSS.....	22½	40
Sole Crepe Trimmings.....	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude.....	15	29
Cut Fines, Crude.....	15½	29¼
Cut Fines, Washed & Dried..	22½	40
Upriver Coarse, Crude.....	12¾	26¼
Upriver Coarse, Washed & Dried	20¼	37¼
Caucho Ball, Crude	11¾	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¼	38¾
Colombian Block	38¼	38¾
Peruvian Prime	38⅝	38¼
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¼	44¼
Centrifuged, Tank Car Lots..	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C for Civilian Use; N-C for Non-Civilian Use.

Scrap Rubber

Dealers report little demand for many grades of scrap rubber, especially the miscellaneous category, and what little demand there is hardly makes it worth while to handle. The supply of natural rubber scrap is reported to be diminishing rapidly, which means that dealers are hard put to handle orders when purchasers insist that the restrictions on percentages of synthetic be fully observed. Recent quotations for mixed tires delivered to eastern points were around $17.50 per ton, and only 50 cents more at Akron, while truck and bus tires were $17.50 at all points. Tire parts are reported as being exceedingly dull. Prices shown below are the ceilings which were set by OPA on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

Little relief in the extremely tight tire fabric situation was evidenced in the past thirty days. Demand is still at an all-time high and gives no sign of slackening for the next several months. The over-all fabric situation is not expected to show too much improvement even if prices are thrown wide open by the complete demise of the Office of Price Administration. Fabric may be down to a half month's supply position by the end of the current month and will probably grow worse before it becomes better. It has also been predicted that if cotton continues to sell at its present high levels synthetic fabrics will make serious inroads as soon as production is increased. Prices shown below are of typical grades of cotton tire cord:

Standard, Peeler, 12/4/2	lb.	.5276
Standard, Peeler, 14/4/2	lb.	.5381
Standard, Peeler, 16/4/3	lb.	.5486
Extra Staple, Peeler, 12/4/2	lb.	.6011
Extra Staple, Peeler, 14/4/2	lb.	.6116
Extra Staple, Peeler, 16/4/3	lb.	.6221

Note: Under OPA regulations mills in Band A add 7.98% to the above prices; mills in Band B add 4.55%.

Sheetings

48x40	36	in.	5.50	lb.	@ 8.272
40x40	36	in.	6.15	lb.	@ 7.398
40x36	36	in.	6.50	lb.	@ 7.000
48x48	40	in.	2.50	lb.	@17.200
48x48	40	in.	2.85	lb.	@15.087
56x60	40	in.	3.60	lb.	@12.638
48x44	40	in.	3.75	lb.	@11.733

Note: Prices shown above are ceiling prices set by order of the O.P.A.

Cotton

The price of middling uplands on the Cotton Exchange has swung in the unusually wide range of 597 points since our last report (June 12), high for the period being 35.84 on July 15 and low 29.87 on June 14. The average price for middling uplands for the month of June was 29.89, based on 24 trading days. There was a slow but steady advance in prices during the first two weeks of the period while the final result of price control legislation was awaited. With the veto of OPA by the President, however, prices spurted to 23-year highs, climbing from 32.15 on July 1 to 35.84 at the close of the period. Other factors contributing to the remarkable rise were expectations of an increase in the foreign demand for American cotton and the report by the Department of Agriculture of the unexpectedly small acreage of 18,316,000 acres as of July 1. The passage of the $3,750,000,000 credit to Great Britain and other loans, notably the one to Czechoslovakia, are expected to maintain prices at current or even higher levels. Quotations for middling uplands on the Exchange follow:

	June 12	July 15		
	Close	High	Low	Close
October	29.28	35.23	34.65	35.23
December	29.42	35.39	34.79	35.38
March	29.47	35.00	34.77	34.99

Reclaimed Rubber

Demand for all types of reclaimed rubber continues at the accelerated pace established several long months ago, stemming from all branches of the industry. Particular activity is marked in the tire, heel and sole, and insulated wire fields, with fair demand from mechanical goods manufacturers. Export requests continue to mount up but so far very little can be spared for this market and few reclaimers are accepting any orders for early shipment. Despite the recent collapse of the Office of Price Administration, there has been no change in the price structure of reclaim. A slight increase in prices was granted to reclaimers at the end of May. Prices shown below are of typical grades of reclaim:

Shoe				
Unwashed	lb.	.08	@	.08¼
Tube				
Black Tube	lb.	.12¼	@	.12½
Red Tube	lb.	.13	@	.13¼
Tires				
Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾
Miscellaneous				
Mechanical blends	lb.	.05½	@	.06½
White	lb.	.14	@	.14¾

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¼
Double filling, A grade	lb.	—	@	.20¼

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Hand Grip Rubber Gauge No. 3-B

Height .....9"	Length .....9¾"	Range .....½"
Depth of Throat ...6½"	Dial 50 Divisions Each Div. 1/1000"	Weight ....4 lbs. Frame . Aluminum

Designed for gauging stock as it is coming from the calender.

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Designers and Manufacturers of

RUBBER PLANT EQUIPMENT

- **All types of Rubber Machinery and Plant Equipment for every requirement of Large and Small Factories.**
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MEDIUM A good value. Very active. High Magnesia content, low in impurities. Medium density.

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Special Service for All Requirements of the Rubber Trade

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Specialist in Magnesia

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TRENTON, N. J.—General Supply & Chemical Co.

STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS												
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1945:													
Jan.	15,626	11,125,799	31.71	206	134,890	29.18	880	476,377	24.17	16,712	1,316	1,024,712	15,396
Feb.	16,592	11,915,425	32.06	402	262,604	29.15	1,843	1,053,328	25.51	18,837	729	625,824	18,108
Mar.	10,254	7,297,267	31.77	434	283,209	29.13	652	384,518	26.33	11,340	1,979	1,420,759	9,361
Apr.	9,743	6,815,597	31.23	253	164,965	29.15	807	486,473	26.91	10,803	1,560	1,148,184	9,243
May	10,375	7,560,578	32.53	235	153,481	29.15	865	525,953	27.14	11,475	208	145,880	11,267
June	7,991	5,467,478	30.54	692	451,629	29.15	675	412,213	27.26	9,358	456	347,623	8,902
July	9,568	6,973,890	32.54	336	219,469	29.15	605	371,245	27.39	10,509	620	455,658	9,889
Aug.	9,741	6,880,325	31.53	624	407,677	29.15	841	506,655	26.91	11,206	894	824,976	10,312
Sept.	9,870	7,050,795	31.89	626	408,651	29.15	668	409,535	27.38	11,164	406	310,128	10,758
Oct.	10,673	7,645,618	31.98	287	187,422	29.15	646	391,971	27.07	11,606	562	369,296	11,044
Nov.	11,177	7,844,162	31.33	296	193,252	29.15	739	446,925	27.65	12,212	254	179,321	11,958
Dec.	12,844	9,273,507	32.24	382	248,604	29.15	819	498,604	27.20	14,045	525	349,385	13,520
1946:													
Jan.	18,580	13,515,971	32.48	569	371,857	29.15	446	263,279	26.33	19,595	164	41,992	19,431
Feb.	32,690	23,944,266	32.70	...	.....	....	318	171,823	24.10	33,008	723	444,400	32,285
Mar.	31,093	22,520,391	32.33	504	328,905	29.15	160	87,344	24.34	31,757	714	488,044	31,043
Apr.	26,234	18,997,757	32.33	1,001	808,463	36.06	874	467,151	23.86	28,109	392	243,952	27,717

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1945:				
Jan.	15,742	11,411	802	97,179
Feb.	20,427	10,228	425	106,953
Mar.	9,146	10,983	1,797	103,319
Apr.	10,046	9,793	867	102,705
May	10,067	10,164	130	102,478
June	9,940	8,995	204	103,219
July	8,739	7,698	756	103,504
Aug.	10,259	7,392	777	105,594
Sept.	12,150	5,799	560	111,385
Oct.	13,984	7,206	78	118,085
Nov.	7,288	7,575	255	117,543
Dec.	7,884	8,185	92	118,715
1946:				
Jan.	25,143	10,355	209	133,294
Feb.	35,104	10,131	290	157,977
Mar.	35,348	12,792	445	180,088
Apr.	19,847	16,956	190	182,789

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Civilian Production Administration.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	..	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1945:						
Jan.	121	74,964	....	.....	....	.....
Feb.	24	17,441	....	.....	....	.....
Mar.	150	69,291	....	.....	....	.....
Apr.	36	18,486	....	.....	..	.....
May	110	60,465	....	.....	3	3,244
June	8	6,872	....	.....	....	.....
July	228	128,129	....	.....	....	.....
Aug.	154	80,296	....	.....	....	.....
Sept.	49	52,148	....	.....	5	2,196
Oct.	130	83,173	....	.....	....	.....
Nov.	303	257,246	....	.....	10	6,547
Dec.	48	58,742	....	.....	18	9,983
1946:						
Jan.	129	121,228	....	.....	....	.....
Feb.	38	35,699	....	.....	5	2,178
Mar.	100	70,315	....	.....	....	.....
Apr.	362	261,098	....	.....	....	.....

Source: U. S. Department of Commerce.

As a MOLD LUBRICANT

—Orvus permits articles to leave molds readily; molds clean easily.
—Orvus is effective in hardest water.
—Orvus forms no insoluble materials which might be deposited as a film on mold or rubber.

For WASHING and FINISHING

—Orvus cleans thoroughly such articles as inner tubes, automotive parts and other molded and extruded rubber goods. Leaves articles with a pleasing finish.

Write for further details about Orvus.

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ORVUS is a sulfated alcohol type cleanser—not a soap.

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AUTOMATIC MILL BATCH-OFF MACHINE

A Big Time and Labor Saver for the Rubber Industry

Why lose valuable mixing time slabbing off by hand when it can be done automatically?

At last you are able to reduce that Banbury cycle.

One more of your synthetic rubber problems solved.

Write Today for Full Particulars

The Akron Standard Mold Co.
Akron — "The Established Measure of Value" — Ohio

Synthetic Rubber

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	672	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1945:					
Jan.	79,037	1,040	64,938	9,253	153,170
Feb.	71,530	483	60,400	6,712	160,169
Mar.	77,298	417	63,846	4,664	169,704
Apr.	75,846	751	59,437	6,688	180,487
May	83,309	1,418	62,837	7,435	193,663
June	78,702	1,270	58,627	7,363	203,018
July	78,650	1,428	52,571	12,085	218,369
Aug.	69,703	1,491	54,439	10,856	224,117
Sept.	63,754	928	45,479	3,801	239,683
Oct.	47,317	237	58,667	1,596	226,550
Nov.	48,634	471	56,227	7,984	214,289
Dec.	46,593	473	56,112	5,341	203,454
1946:					
Jan.	56,089	.....	66,993	5,715	177,051
Feb.	51,848	.....	63,770	6,415	144,427
Mar.	60,363	1,429	74,214	17,707	115,310
Apr.	66,014	536	70,248	12,892	101,932

Source: Civilian Production Administration.
Note: Production figures include the output of privately-owned and government plants. Figures for 1941 are estimated.

Synthetic Rubber — By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)[b]	GR-I (Butyl)	Buna N Types[b]	Total
1942	3,721	8,956	.....	9,734	22,411
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	725,000	45,500	51,900	7,900	830,300

Consumption

1942	2,579	6,833	.....	8,217	17,629
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945[a]	676,600	48,400	43,700	8,500	777,200

Exports

1942	222	1,037	.....	160	1,419
1943	20,357	2,769	40	709	23,875
1944	99,242	5,093	630	679	105,644
1945	.....	.....	.....	.....	.....

Stocks at End of Period

1942	1,050	1,786	.....	1,772	4,608
1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	165,000	9,200	18,000	4,700	196,900

Sources: From miscellaneous Government reports.
Notes: [a] Consumption figures for 1945 include exports; [b] Including production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1939	1940	1941	1942	1943	1944	1945	1946
Jan.	38,089	40,370	46,190	49,216	36,085	47,540	51,125	51,186
Feb.	34,928	37,557	42,782	42,666	36,274	47,754	49,013	47,889
Mar.	43,042	44,607	49,572	50,820	41,586	52,263	55,449	56,801
Apr.	44,264	47,683	55,879	49,554	48,177	50,005	59,147	62,045
May	49,766	52,946	60,121	53,212	49,828	54,230	60,828	.....
June	50,133	55,459	59,062	50,077	52,325	54,266	60,597	.....
July	50,689	53,865	63,906	54,606	49,867	55,119	66,218	.....
Aug.	54,025	55,346	63,575	48,793	51,880	55,616	70,027	.....
Sept.	49,505	52,297	59,768	50,093	49,707	56,318	64,550	.....
Oct.	49,854	53,807	58,412	50,094	53,111	53,154	55,743	.....
Nov.	47,407	49,074	54,670	50,729	50,703	54,967	53,581	.....
Dec.	43,807	46,413	53,568	39,250	48,695	52,250	50,129	.....
Total	555,509	589,424	667,505	589,110	568,238	633,482	696,407	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	285,114	254,820	64.6	30,405	42,532
1943	303,991	291,082	59.6	15,678	46,201
1944	260,607	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1945:					
Jan.	21,992	20,777	27.2	1,419	43,628
Feb.	20,131	20,760	29.4	1,055	39,444
Mar.	22,042	22,891	30.6	1,409	37,186
Apr.	20,389	20,234	29.2	1,125	36,216
May	22,249	22,459	30.8	971	35,035
June	20,187	19,873	29.4	996	34,353
July	17,033	15,976	26.5	836	34,574
Aug.	18,804	18,663	30.2	834	33,881
Sept.	17,246	17,365	33.9	1,323	32,439
Oct.	22,044	22,185	33.7	1,195	31,103
Nov.	20,560	20,263	31.8	859	30,541
Dec.	20,632	19,590	30.5	1,391	28,155
1946:					
Jan.	24,458	22,031	28.5	1,253	29,099
Feb.	23,187	20,702	28.0	1,368	30,216
Mar.	25,136	22,075	26.0	1,841	31,436
Apr.	23,937	22,469	25.8	1,238	31,666

Source: 1936-40, Department of Commerce; 1941 to date, Civilian Production Administration.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1938	2,000,985	485,852	2,486,837
1931	1,973,090	416,648	2,389,738	1939	2,866,796	704,308	3,571,104
1932	1,135,491	235,187	1,370,678	1940	3,692,328	721,637	4,413,965
1933	1,573,512	346,545	1,920,057	1941	3,744,300	875,381	4,619,681
1934	2,177,919	575,192	2,753,111	1942	220,814	133,083	353,897
1935	3,252,244	694,690	3,946,934	1943	0	4,501	4,501
1936	3,669,528	781,862	4,451,390	1944	0	124,819	124,819
1937	3,915,889	892,382	4,808,271	1945	83,792	313,643	397,435
1945							
Jan.	0	15,019	15,019	July	359	31,394	31,753
Feb.	0	14,032	14,032	Aug.	1,381	27,532	28,913
Mar.	0	18,339	18,339	Sept.	580	30,106	30,686
Apr.	0	18,980	18,980	Oct.	16,839	40,900	57,739
May	0	22,315	22,315	Nov.	34,611	53,103	87,714
June	0	23,131	23,131	Dec.	30,022	28,792	58,814
1946							
Jan.	58,575	54,864	113,439	July	.....	.....	.....
Feb.	47,965	28,692	76,657	Aug.	.....	.....	.....
Mar.	90,045	39,359	129,404	Sept.	.....	.....	.....
Apr.	150,206	81,282	231,488	Oct.	.....	.....	.....
May	152,948	74,650	227,598	Nov.	.....	.....	.....
June	142,313	58,739	201,052	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales.

Rim Production

	1940	1941	1942	1943	1944	1945
Passenger Car	17,026,812	17,828,994	1,025,880	780,291	1,748,917	4,504,368
Truck & Bus	3,857,316	6,464,725	5,298,603	4,949,004	6,391,441	6,486,652
Agricultural	1,004,319	1,576,720	194,900	301,997	997,301	1,441,909
Earth Mover	2,767	2,593	1,814	945	703	1,308
Total	21,891,214	25,873,032	6,521,197	6,032,237	9,138,362	12,434,237

1945	Jan.	Feb.	Mar.	Apr.	May	June
Passenger Car	1,055,083	715,798	791,405	1,074,479	1,155,792	1,026,227
Truck & Bus	493,890	256,743	361,033	457,821	316,796	409,094
Agricultural	184,312	164,664	123,791	133,502	115,491	162,838
Earth Mover	118	196	183	328	251	309
Total	1,733,403	1,137,401	1,276,412	1,666,130	1,588,330	1,598,468

Source: The Tire & Rim Association, Inc.

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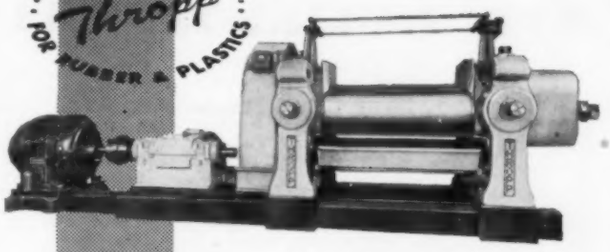

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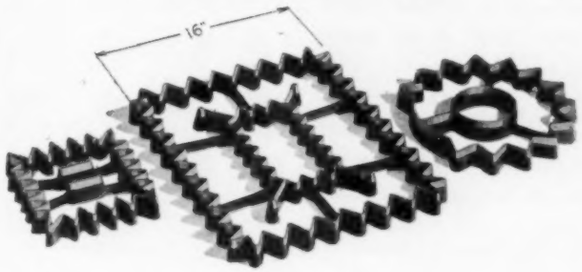

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Stripper, Textile
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NORTH PORTLAND, OREGON
APOPKA, FLORIDA

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935 (total)	19,263	29,406	1,514	50,183	49,362	8,196
Passenger Car	17,063	26,036	948	44,047	43,256	7,054
Truck and Bus	2,200	3,370	566	6,136	6,106	1,142
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,720	8,803	207	15,730	15,348	6,247
Passenger Car	872	2,665	38	3,575	2,752	4,432
Truck and Bus	5,848	6,138	169	12,155	12,596	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946:						
Jan. (total)	576	4,870	91	5,537	5,973	3,436
Passenger Car	362	3,984	35	4,381	4,705	2,481
Truck and Bus	214	886	56	1,156	1,268	955
Feb. (total)	475	4,900	93	5,468	5,801	3,487
Passenger Car	270	4,034	29	4,333	4,585	2,496
Truck and Bus	205	866	64	1,135	1,216	991
Mar. (total)	730	5,786	105	6,621	6,686	3,392
Passenger Car	516	4,739	47	5,302	5,310	2,383
Truck and Bus	214	1,047	58	1,319	1,376	1,009
Apr. (total)	1,105	5,756	128	6,989	6,883	3,304
Passenger Car	774	4,752	57	5,583	5,515	2,327
Truck and Bus	331	1,004	71	1,406	1,368	977

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1943:							
Jan.-Mar.	11,155	34,287	7,819	53,261	564	9,833	10,397
Apr.-June	11,625	34,684	8,549	54,858	1,253	10,185	11,438
July-Sept.	15,754	36,854	9,618	62,226	1,220	9,184	10,404
Oct.-Dec.	15,928	42,639	10,464	69,031	1,806	12,055	13,861
Total	54,462	148,464	36,450	239,376	4,843	41,257	46,100
1944:							
Jan.-Mar.	17,135	42,783	11,452	71,370	1,812	15,830	17,642
Apr.-June	17,587	40,580	11,499	69,666	1,353	19,586	20,939
July-Sept.	16,653	38,462	11,055	66,170	1,299	25,915	27,214
Oct.-Dec.	12,982	34,107	10,948	58,037	2,773	33,630	36,403
Total	64,357	155,932	44,954	265,243	7,237	94,961	102,198
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	*a*	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	16,758	37,036	14,988	68,782	*a*	51,086	51,086

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935	19,218	28,095	754	48,067	47,879	8,231
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946:						
Jan.	602	3,602	83	4,287	4,640	4,121
Feb.	492	3,806	88	4,386	4,874	4,418
Mar.	764	4,776	109	5,649	5,840	4,519
Apr.	1,113	4,842	124	6,079	6,114	4,190

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1928	41¼	17	22.48
1911	184	114	141.30	1929	26⅜	15½	20.55
1912	140	108	121.60	1930	16½	7½	11.98
1913	113	59	82.04	1931	8⅝	4¼	6.17
1914	93	56	65.33	1932	4¾	2½	3.49
1915	79	58½	65.85	1933	9⅞	2⅞	5.96
1916	102	55	72.50	1934	15⅞	8¾	12.92
1917	90	52	72.23	1935	13¾	10½	12.37
1918	70	40	60.15	1936	23	13½	16.41
1919	57	38½	48.70	1937	26⅞	14	19.39
1920	56½	16	36.30	1938	17⅞	10¼	14.64
1921	21¾	11½	16.36	1939	24	14⅜	17.57
1922	28⅜	13⅝	17.50	1940	24	18¼	20.10
1923	37⅛	24¾	29.45	1941	24⅞	19⅛	22.40
1924	40⅛	17⅜	26.20	1942	22½	22½	22.50
1925	121	34⅜	72.46	1943	22½	22½	22.50
1926	88½	36¾	48.50	1944	22½	22½	22.50
1927	41¾	33	37.72	1945	22½	22½	22.50

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1939	1940	1941	1942	1943	1944	1945	1946
Jan.	8.94	11.19	10.66	19.85	21.34	20.76	22.36	25.49
Feb.	8.97	11.10	10.87	20.05	21.61	21.34	22.29	26.57
Mar.	9.00	10.90	11.08	20.42	21.98	21.65	22.43	27.52
Apr.	8.87	10.89	11.48	21.10	22.02	21.71	21.88	28.40
May	9.56	10.33	12.97	20.88	21.97	21.63	23.30	28.17
June	9.88	10.72	14.66	19.78	21.92	22.31	23.42	29.89
July	9.71	10.42	16.55	20.27	21.46	22.33	23.27	....
Aug.	9.30	9.84	17.06	19.45	21.09	22.11	23.10	....
Sept.	9.30	9.69	17.94	19.62	21.10	22.10	23.25	....
Oct.	9.24	9.62	17.31	19.79	21.00	22.32	23.85	....
Nov.	9.73	9.97	17.21	20.21	20.32	22.13	24.71	....
Dec.	10.97	10.18	18.09	20.55	20.32	22.28	25.21	....
Average for Year	9.46	10.40	14.66	20.16	21.34	21.89	23.25	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [a]	Adhesives [b]	All Other [c]
1945:					
July	1,212	2,041	....	....	1,669
Aug.	1,141	1,813	3,956	....	1,334
Sept.	1,185	1,367	2,216	225	666
Oct.	1,459	1,492	4,194	278	326
Nov.	1,135	1,102	4,814	329	479
Dec.	1,326	1,058	4,793	347	526
1946:					
Jan.	1,569	1,650	5,496	399	352
Feb.	1,666	1,035	5,910	390	589
Mar.	2,161	1,689	6,665	....	1,276

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers and extruders; (b) Resin content; (c) Excludes data for protective coating resins.

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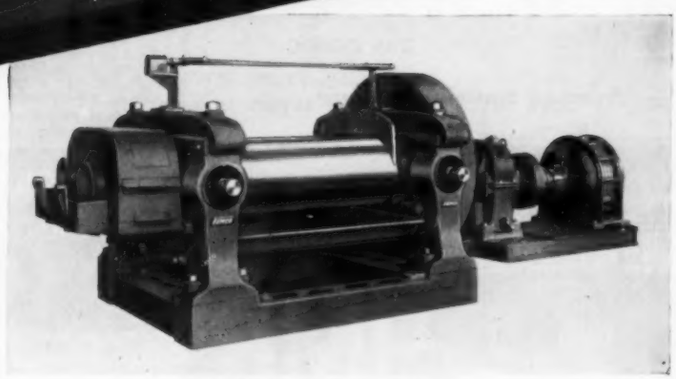

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

Month	1945 All Rubber Products Number	1945 All Rubber Products Index	1945 Rubber Tires & Tubes Number	1945 Rubber Tires & Tubes Index	1946 All Rubber Products Number	1946 All Rubber Products Index	1946 Rubber Tires & Tubes Number	1946 Rubber Tires & Tubes Index
Jan.	199	164.9	97	178.5	209	172.7	99	182.4
Feb.	200	165.1	96	178.0	214	177.1	101	187.3
Mar.	209	173.2	96	176.8	220	181.5	104	191.6
Apr.	205	169.6	93	172.2	222	183.4	...	....
May	201	166.6	92	169.2	...	....	...	....
June	199	164.5	90	166.7	...	....	...	....
July	194	160.5	88	162.1	...	....	...	....
Aug.	191	158.0	86	159.3	...	....	...	....
Sept.	165	136.5	72	132.7	...	....	...	....
Oct.	187	154.4	88	163.0	...	....	...	....
Nov.	194	160.1	91	168.9	...	....	...	....
Dec.	203	168.2	96	177.8	...	....	...	....

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	291.0	288.9	323.2	342.4	290.1	272.6
Feb.	295.7	295.6	323.6	339.8	292.1	271.9
Mar.	297.0	299.3	315.4	301.9	302.8	281.1
Apr.	281.3	280.0	315.9	306.0	....	....
May	283.3	283.0	299.8	288.6	....	....
June	281.4	278.5	304.3	293.8	....	....
July	279.7	280.9	298.7	286.8	....	....
Aug.	291.0	294.3	265.7	249.7	....	....
Sept.	294.5	300.8	231.3	211.4	....	....
Oct.	293.3	297.5	254.2	239.8	....	....
Nov.	293.6	298.2	257.8	240.2	....	....
Dec.	308.5	319.4	275.5	256.7	....	....

Wages — Average Weekly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$48.18	$55.79	$54.49	$64.29	$46.71	$50.29
Feb.	48.95	57.21	54.40	64.04	45.85	48.90
Mar.	49.53	58.38	50.62	57.29	46.27	49.72
Apr.	48.12	55.63	51.93	59.75	....	....
May	48.98	57.11	50.09	57.32	....	....
June	49.30	56.78	51.45	59.20	....	....
July	49.17	57.01	51.81	59.59	....	....
Aug.	50.24	58.62	46.76	52.81	....	....
Sept.	50.99	59.33	47.20	53.59	....	....
Oct.	50.92	58.54	45.57	49.48	....	....
Nov.	50.59	58.30	44.68	47.78	....	....
Dec.	52.64	61.62	45.48	48.54	....	....

Wages — Average Hourly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$1.066	$1.224	$1.151	$1.317	$1.121	$1.255
Feb.	1.072	1.240	1.149	1.314	1.129	1.266
Mar.	1.086	1.256	1.117	1.260	1.138	1.275
Apr.	1.075	1.234	1.136	1.294	....	....
May	1.087	1.257	1.132	1.284	....	....
June	1.092	1.254	1.140	1.307	....	....
July	1.094	1.256	1.138	1.296	....	....
Aug.	1.102	1.264	1.119	1.269	....	....
Sept.	1.117	1.273	1.098	1.243	....	....
Oct.	1.108	1.263	1.100	1.231	....	....
Nov.	1.107	1.258	1.112	1.249	....	....
Dec.	1.130	1.290	1.113	1.247	....	....

Hours — Average Weekly Hours per Worker

Month	1944	1945	1946	Month	1944	1945	1946
January	45.2	47.3	41.7	July	45.0	45.5	...
February	45.7	47.3	40.6	August	45.6	41.8	...
March	45.6	45.3	40.7	September	45.7	43.0	...
April	44.7	45.7	...	October	45.9	41.4	...
May	45.1	44.2	...	November	45.7	40.2	...
June	45.2	45.2	...	December	46.6	40.9	...

Source: U. S. Department of Commerce.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1944	1945	1946	Month	1944	1945	1946
Jan.	242	247	215	July	227	218	...
Feb.	244	247	215	Aug.	231	193	...
Mar.	242	236	220	Sept.	230	172	...
Apr.	231	233	223	Oct.	231	191	...
May	230	224	...	Nov.	231	192	...
June	228	222	...	Dec.	239	205	...

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	274	311	229	July	295	274	...
Feb.	299	351	242	Aug.	288	255	...
Mar.	290	351	...	Sept.	297	200	...
Apr.	295	356	...	Oct.	342	260	...
May	293	333	...	Nov.	293	212	...
June	316	333	...	Dec.	341	292	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	179.6	170.6	173.7	July	174.7	183.3	....
Feb.	185.2	176.7	179.9	Aug.	172.9	182.4	....
Mar.	187.6	175.5	....	Sept.	174.3	177.4	....
Apr.	190.6	175.3	....	Oct.	174.3	167.7	....
May	188.1	178.3	....	Nov.	176.1	167.1	....
June	182.1	178.7	....	Dec.	169.6	169.0	....

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1939	1940	1941	1942	1943	1944	1945
Asphalt [a]							
Short tons	24,293	22,772	20,536	22,263	16,510	20,189	.....
% of total	1.0	0.9	0.6	0.6	0.5	0.6	.....
Barite (Barytes):							
Short tons	3,319	4,283	9,800	6,334	8,000	10,000	10,000
% of total	2.0	2.3	4.2	3.6	3.9	2.9	2.1
Carbon Black:							
Short tons	158,311	155,090	219,751	147,974	236,737	369,015	402,193
% of total	56.5	58.5	68.2	65.8	75.2	78.7	78.9
Clay, Kaolin:							
Short tons	90,287	92,640	127,055	51,334	50,964	59,588	109,936
% of total	11.6	11.1	11.6	5.1	5.5	6.8	11.7
Clay, Fire & Stoneware:							
Short tons	3,770	10,104	9,000	5,000	10,259	7,160	7,800
% of total	0.2	0.4	0.2	0.1	0.2	0.1	0.1
Lead Sulfate, Basic:							
Short tons	140	128	200	89	131	268	200
% of total	2.5	2.1	1.9	1.1	2.3	4.2	5.2
Lime:							
Short tons	1,357	1,879	3,058	1,381	2,039	5,634	7,170
% of total	0.03	0.03	0.05	0.02	0.05	0.13	0.10
Litharge:							
Short tons	1,404	1,590	3,968	3,460	4,302	3,023	1,864
% of total	1.6	1.8	3.3	3.8	3.8	2.2	1.3
Lithopone:							
Short tons	3,189	3,387	3,547	1,047	1,078	726	977
% of total	2.2	2.2	2.0	0.8	0.8	0.5	0.7
Mica, Ground:							
Short tons	2,539	1,731	3,476	1,754	3,063	1,137	3,715
% of total	8.2	6.2	8.0	3.7	6.0	2.2	7.0
Sulfur:							
Short tons	49,000	54,000	63,000	40,000	51,000	63,000	65,000
% of total	2.5	2.5	2.4	1.4	1.8	1.9	2.0
Talc [b]							
Short tons	31,078	28,501	58,114	40,487	48,994	51,833	62,049
% of total	12.4	10.0	13.9	10.0	11.8	13.0	15.0
Zinc Oxide:							
Short tons	70,187	70,979	90,429	52,717	67,898	59,518	63,447
% of total	61.3	62.8	63.4	53.0	47.4	42.3	49.6

Source: U. S. Bureau of Mines.

Notes: [a] Solid and semi-solid products of less than 200 penetration. [b] Includes pyrophyllite and ground soapstone.

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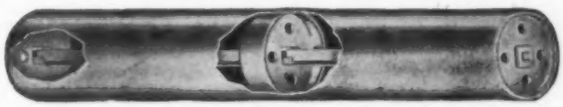

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